NATUR CYMRU
Nature of Wales

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- The plight of the uplands
- Welsh tundra
- The Black Mountains
- Pearl-bordered fritillaries
- Planhigion meddyginiaethol
- Llysdinam Field Centre
- One farm's flora

Books, news, comment ...

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J Harold

GOLYGYDDOL EDITORIAL

Nid oes robinod coch na chelyn ar gyfyl rhifyn y Nadolig. Yn hytrach, ceir pedair erthygl sy'n cnoi cil ar natur a chadwraeth yn Ucheldiroedd Cymru. Mae dirywiad adar sy'n bridio yn SoDdGA Pumlumon yn dystiolaeth nad yw'r dulliau o reoli'r ucheldiroedd arbennig hyn yn gweithio i fywyd gwyllt. Mae Mick Green yn dadlau bod angen dull newydd, gan symud tuag at 'ailwylltio' a gadael i natur a phrosesau naturiol siapio'u dyfodol. Mae John Harold yn ystyried y nodweddion arbennig sy'n perthyn i ryw fath o dwndra Cymreig, cynefin mynyddig uchel Yr Wyddfa. Gwêl fywyd mewn byd â'i ben i waered lle y gall ffyngau ymgodi uwchben helyg bach, ac mae'n dadlau dros leihau'r pwysau pori yn y tymor byr. Iddo ef, mae'r agenda 'ailwylltio' yn fygythiad arall i gynefin unigryw. Yng ngoleuni'r dadleuon a gyflwynir o blaid 'ailwylltio', mae David Elias yn cnoi cil ar ddegawdau o gadwraeth yn y Berwyn. Daw i'r casgliad bod llawer wedi'i gyflawni, ond bod angen i'r dulliau rheoli fod yn hyblyg, mewn cytgord â'r gwahaniaethau ymhob daliad, gan esblygu wrth inni ddysgu mwy am y grefft gynnil o reoli tir. Mae Bradley Welch hefyd yn sôn am reoli tir, a sut y caiff Cronfa Natur Llywodraeth Cymru ei defnyddio i adfer mawn sy'n erydu ar ran y Mynydd Du o Fannau Brycheiniog.

Tinwen y Garn
Oenanthe oenanthe
Wheatear

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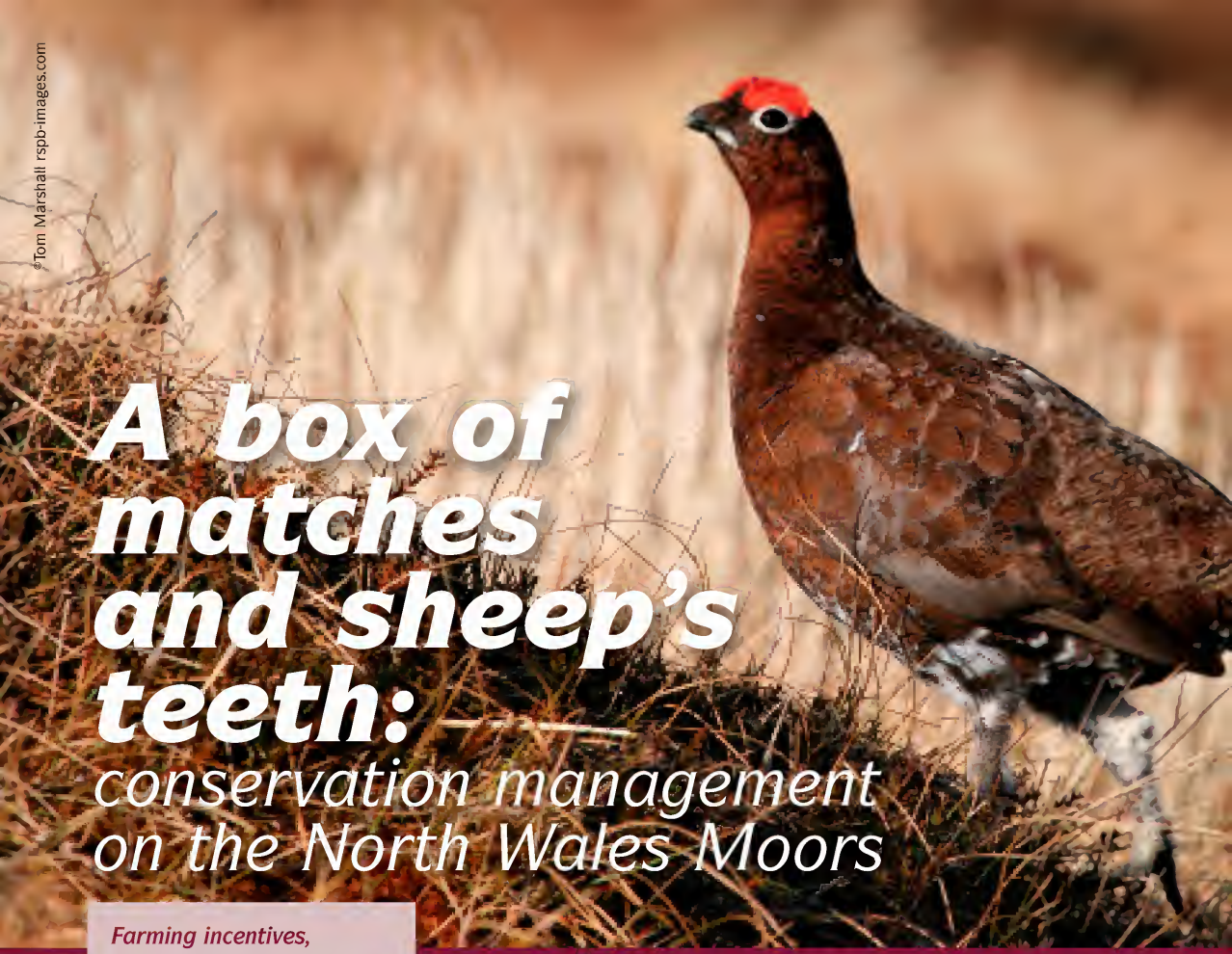
Mae'r gwahaniaethau rhwng yr asesiadau hyn yn bwysig, ond hefyd ceir nifer o bwyntiau tebyg. Gydag erthyglau eraill yn y rhifyn hwn, gobeithio y gallwn danio trafodaeth ynghylch ein hamgylchedd gwerthfawr a'r dulliau gorau o'i warchod.

James Robertson a Geoff Gibbs

In this Christmas edition there are no robins or holly. Instead, four articles reflect on nature and its conservation in the Welsh Uplands. The decline of upland breeding birds in the Pumlumon SSSI is evidence that the management of these special upland habitats is not working for wildlife. Mick Green argues for a new approach, a move towards 're-wilding', letting nature and natural processes shape their future. John Harold considers the special qualities of a kind of Welsh tundra, the high mountain habitats of Snowdonia. He sees beauty in an upside down world where fungi may tower over the 'quietly brilliant dwarf willow', and argues for careful and short-term easing of grazing pressure. For him, the 're-wilding' agenda poses another threat to a unique habitat. In the light of the arguments put forward for 're-wilding', David Elias reflects on recent decades of conservation effort in the Berwyn. He concludes that much has been achieved, but that management needs to be flexible, attuned to the differences in each holding, and able to evolve as more is learnt about the subtle art of land management. Bradley Welch also talks about land management, and how the Welsh Government's Nature Fund is being used to restore eroding peat in the Black Mountains section of the Brecon Beacons.

There is value in the differences in these assessments, but there are also many points of similarity. Along with other articles in this issue, we hope we can stimulate debate about our precious environment and how best to look after it.

James Robertson and Geoff Gibbs



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A box of matches and sheep's teeth:

conservation management on the North Wales Moors

Red grouse *Lagopus lagopus scotica* Grugiar goch

Farming incentives, particularly payments tied to the number of sheep which farmers kept in the uplands, resulted in damage to wildlife through overgrazing of moorland habitats in north Wales. That was 30 years ago. Could some areas now be under-grazed? DAVID ELIAS considers what has been achieved and the management challenges which remain, and concludes that there is much still to learn.

When I arrived on the Berwyn Mountains in 1983 the place was in uproar. The Nature Conservancy Council (later Countryside Council for Wales, CCW) was attempting to notify a very large moorland SSSI at a time when farmers were being encouraged by government to convert rough grazing to reseeded pasture, as well as receiving payments per head for keeping sheep, which inevitably encouraged maximum stocking. At the same time foresters, through tax breaks for the wealthy, were buying up similar land to plant conifers. It was a perfect storm which led to a long and sometimes bitter battle on the Berwyn, and to a lesser extent on other moorland areas in North Wales. But fortunately much has changed over the last 30 years.

Back then the imperative for conservation was not to lose large chunks of moorland habitat and to prevent what remained from being grazed to death. So we spent years pursuing designations to protect the site (SSSI, SAC, SPA, NNR) and negotiating management agreements with farmers, principally to reduce the size of their flocks in exchange for financial

payments. The good news is that, by and large, it worked. The designations stopped the outright damage, and the management agreements, and agri-environment schemes that followed, reduced the grazing pressure. Much of the heathland and blanket bog vegetation across the North Wales moors has recovered from grazing damage. From the perspective of the early '80s that is a huge achievement.

However, change has been happening in other ways as well. The average age of farmers has become alarmingly high, 59 at the last UK count, and many of those in Wales are part-time. Smaller flocks on the 'mountain' land mean there is less competitive pressure for sheep to graze the rougher and higher moorland vegetation. This is exacerbated by farmers keeping fewer hardy Welsh Mountain sheep; the more profitable crossbreeds that have replaced them are even less keen on rough grazing. The upshot of all of this is that many farmers now make little use of their moorland grazing for much of the year. Natural Resources Wales (NRW), the successor to CCW, now sometimes specify *minimum* numbers of sheep in their management agreements, which is an extraordinary turn around. Amongst conservationists there is now much talk of 'under-grazing'. I sometimes wonder if our stock reduction requirements were too stringent back then, but in the face of the chronic grazing damage to heather, provoked by the headage payment system, drastic action was required.

Area payments and unforeseen consequences

The subsequent switch to area-based farm payments, which began in the '90s, is perhaps the most important change in the history of grazing these moors. Farmers began to see low stocking rates on their 'mountain' as a viable and voluntary option. Progressive though this was there were some

David Elias

Cotton grass (*Eriophorum angustifolium* Plu'r Gweunydd) on the Berwyn

unforeseen consequences. Although some grazing damage to heather still occurs, usually in places with a grass/heather mix, parts of the Berwyn and Migneint have developed a closed sward of heather and moss that is becoming virtually ungrazable. This, coupled with the shift to crossbreeds, means that the hefts – the self-sustaining territories of sheep flocks, which are critical to flock management on the open moor – have broken down irretrievably in some places. All of this makes me wonder how long government will go on subsidising grazing on heather moorlands in Wales if they remain so underused by farmers. Could priorities switch to afforestation and carbon sequestration over the next 20 years or so, in the face of escalating climate change?

Another consequence of these changes is the colonisation of heather by self-seeded trees, sometimes birch and rowan, but more often sitka spruce, which is the principal seed source in upland Wales these days. This isn't just a few trees here and there: in 2009/10 RSPB removed 11,500 spruce trees from its reserve on the Berwyn. It turns out that there was another unholy coincidence: by the time the conifers planted in the '70s and '80s began bearing cones, grazing levels on adjoining moorland were being reduced and the young seedlings were no longer getting nibbled off, especially amongst tall heather.

Something we had barely begun to think about 30 years ago was the drying out of blanket bog due to

David Elias

Ruabon mountain; partial cutting of the heather allows the sheep to graze

drainage. This habitat has been criss-crossed with thousands of ditches cut in the peat by farmers (incentivised by government) to try and dry out the land. Over the last 20 years conservationists have begun to address this and in the '90s, with EU Life Project funding, 485km of drains were blocked on the North Wales moors in an attempt to re-wet the blanket bogs. Now the water table is gradually rising, but it may take many years for the full consequences of this to be appreciated. In truth we don't really know what blanket bogs in Wales would have looked like prior to drainage and historic peat cutting, which was extensive. The latest thinking by RSPB and NRW is that because these bogs have been somewhat dried out they have become less diverse, over-dominated by heather at the expense of open patches of bog mosses (*Sphagna*). Although the presumption is that cutting, like burning, can damage blanket bog, a one-off cut and/or grazing with cattle or ponies is being considered to help restore structure and diversity. The RSPB are in a unique position to pioneer such management: they farm in-hand 4,000 hectares of moorland on their Vyrnwy reserve on the Berwyn with a flock of 3,200 Welsh Mountain ewes and 45 Welsh Black cattle. Their aim eventually is to demonstrate that a viable farming operation can be run hand in hand with moorland conservation.

Changing moorland management

Moorland gamekeepers used to say that all you needed to manage a moor was 'a box of matches and sheep's teeth': the matches to patch-burn heather to provide red grouse with feeding and shelter/nesting habitat in close proximity, and the sheep's teeth to prevent the vegetation from becoming too 'rank'. By now we have fewer sheep's teeth on our moors and the matches aren't often needed as burning has mostly been abandoned; there are too few days when the weather is suitable for burning and not enough skilled labour to call upon, so very little gets done. Also, over most of this moorland you would now need NRW's consent to burn, which wouldn't necessarily be forthcoming.

However, in the early '90s some moorland managers began experimenting with cutting heather using tractor-powered machinery. This has the big advantage that it can be done in all kinds of weather and uses very little labour. The resulting letterbox-shaped strips are now a familiar sight across the hills of North Wales. At Vyrnwy the RSPB have been gradually developing cutting patterns which enable sheep to distribute themselves across the moorland, so grazing it more evenly. This has been attracting interest from other moorland landowners as a possible way forward for reinstating grazing on 'neglected' moors.

As far as I know there are no longer any driven grouse moors in Wales. These require intensive management to produce a large surplus of grouse that can be driven over lines of guns to be shot. This absence is a blessing as it spares us the current

conflict raging in England and Scotland over the consequences of intensive heather burning to habitats and 'ecosystem services', plus the related problem of the illegal and scandalous killing of birds of prey. Shooting interests have not persecuted hen harriers in Wales in recent times.

In the early '80s when these moorland sites were being evaluated, the characteristic bird populations were relatively high (by post-war standards) and were an important reason for designation (SSSI, SPA). Sadly this is no longer the case, and habitat management does not seem to have been the critical factor. With a few caveats these birds are in decline; some, such as curlew, drastically so[1,2]. Perhaps only hen harrier and, in some places, black grouse have bucked the trend in Wales. The reasons for an overall decline are far from clear. If you speak to shooting people and some conservationists they would say 'predation' – largely meaning foxes and crows. The research seems to show that the level of predation of birds on moorland increases with the proximity of 'woodland'[3]. We may be reaping another consequence of our hills having been planted with conifers.

In the '90s CCW, in partnership with The Game and Wildlife Conservation Trust (a body that represents shooting interests), carried out a five-year predator control programme on the Berwyn NNR. The results

Andy Hay rspb-images.com

Black grouse *Tetrao tetrix* Grugiar ddu

from this were disappointing; apart from a rise in black grouse there was no beneficial effect on bird numbers[1]. The RSPB is beginning to consider predator control on their reserve at Vyrnwy. Shooting estates on the North Wales moors have routinely controlled predators but still the populations of most moorland birds have fallen[2]. There seems to be mixed research evidence about the usefulness of predator control on moorlands[3,4] but it may need to be intensive and over as large an area as possible to be effective. There are probably many reasons for the declines in moorland bird populations, perhaps including conditions away from the moors where many birds winter. There is still much we don't understand.

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Curlew (*Numenius arquata* Gylfinir) are in decline on Welsh uplands

'Re-wilding'

When I read George Monbiot's powerful book *Feral* last year I was inspired and provoked in about equal measure, which was no doubt the desired effect. Monbiot's treatise is that conservationists are fiddling about in an agricultural landscape using agricultural methods, and

have lost sight of the full wild potential of our countryside. He advocates 'rewilding', letting nature have its head over large areas of land, particularly in the uplands – and eventually reintroducing wild grazing animals and their predators.

His book sent me hurrying back to the Berwyn, Cwm Idwal and other upland areas to see if we had 'got it all wrong.' In the end I concluded that we had not, at least according to the evaluation system in place. It is, ultimately, that value system that Monbiot is quarrelling with. Moorland is anthropogenic in origin; in modern Wales it *is* an agricultural landscape formed principally by the grazing of sheep and the burning of heather. It may look and feel wild, mainly because it is high and covered in native vegetation, but it is a product of farming. The inescapable conclusion of this is that if we continue to value it, then we need to graze it; although that begs the question as to whether farmers will be willing to go on doing that. George Monbiot would have us abandon grazing, cutting and burning and let the moors and mountains revert to woodland wherever they will.

There have been a number of no-grazing experiments, for example in Cwm Idwal, Pumlumon and smaller areas where sheep no longer go, which suggest that this process is far from automatic. Craig y Llam on the south side of the A487 in Tal-y-llyn Pass is a wonderful demonstration of the slow progress that ungrazed areas make towards woodland. Mature and diverse native woodland would take a long time to develop, perhaps hundreds of years; whilst not a problem in itself, that would be hard to stomach if it was replacing habitat of high conservation value. It would also necessitate, in my view, cutting out the colonising exotics such as sitka spruce and rhododendron.

It should also be borne in mind that many areas of moorland and mountain in Wales are now covered by conservation designations and/or agri-environment schemes, under which such 'reversion' would not be allowable, however desirable. Perhaps experiments with rewilding in the uplands should be tried in areas of lowest biodiversity. I would have some sympathy with this in parts of the Cambrian mountains (a favourite target of Monbiot's – he lived in Machynlleth) which have about as much biodiversity as the average car park, but the social implications of such ideas for farming communities should give us all pause for thought.

Although heather management is necessary for

David Elias

Blanket bog near Dduallt

David Elias

Craig y Llam, showing the sharp contrast between grazed land on the left and ungrazed on the right

farming and grouse shooting, it is not clear to me that it directly benefits wildlife, other than for red and black grouse, and it may well be detrimental to invertebrates (always the Cinderella), lower plants and fungi. Moorland managers, like farmers, foresters and gardeners, often have a strong urge to 'do something' but I wonder if there is sometimes a case, in some heather-dominated areas that farmers have given up on, for doing nothing; letting the heather grow tall, fall open and die, allowing new seedlings to arise in its place. A sort of waist level rewilding if you like, where not much would be required, except to cut out colonising trees. The moths, fungi and even the odd hen harrier might bless us for that.

It is clear that there is not one approach that fits all for wildlife on these moors. What is needed urgently is a workable, financially viable and cooperative model for moorland management that is flexible enough for the circumstances on each farm holding – and that can evolve as we learn. Nature conservation management is a new and developing field. Farmers have been caring for a handful of species for thousands of years. We have been trying to look after thousands of species for a handful of years. There is still much to learn.

Acknowledgements
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***David Elias** was CCW's officer on the Berwyn Mountains from 1983-1996. He publishes a nature-writing blog at: dispatchesfromtheundergrowth.com. Contact him at elias.cefnprys@btinternet.com*

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Rhosydd Gogledd Cymru

Gall mympwyon cymorthdaliadau ffermio arwain at ganlyniadau dramatig i fywyd gwyllt y rhostiroedd. Ar un adeg roedd grug yn cael ei bori'n ormodol, ond mae bellach wedi dod mor gyffredin fel bod defaid yn cael trafferth i'w bori. I raddau helaeth rhoddwyd y gorau i losgi grug; yn hytrach mae rheolwyr rhostiroedd yn defnyddio peiriannau i ladd grug mewn patrymau sy'n caniatáu i ddefaid wasgaru dros y rhostir, er mwyn iddo gael ei bori'n fwy cyson.

Mae rhai o blaid 'ail-wylltio"r ucheldiroedd, ond canlyniad ffermio yw rhostir Cymru fodern. Os ydym yn ei werthfawrogi, yna mae angen inni ei bori. Gall rhannau heb eu pori gymryd cannoedd o flynyddoedd i ddatblygu'n goetir aeddfed. A ddylem ni adael iddo ddisodli cynefin sy'n hynod werthfawr o safbwynt cadwraeth? Gallai coed bedw a chriafol ifanc ffynnu ond dylid cael gwared o goed egsotig sy'n hunan-hadu, megis sbriws Sitka a rhododendron.

Byddai ail-wylltio hefyd yn effeithio ar gymunedau ffermio, ac mae llu o ddynodiadau cadwraethol a/neu gynlluniau amaeth-amgylcheddol mewn grym mewn sawl ardal o'r ucheldiroedd ac ni fyddai'r rhain yn caniatáu ail-wylltio o'r fath.

Mick Green

The Welsh Uplands - *death or resurrection?*

A patch of naturally 'rewilded' peatland within forestry just off the A44 near Ponterwyd. It shows that areas don't fully scrub up but there is plenty of open peatland and a nice scattering of trees

The reality confounds all the good environmental intentions which have been promised for the uplands. Agricultural policy reform, agri-environment schemes and the like have not released the pressure which has been driving nature from the hills, as a recent survey illustrates. MICK GREEN argues that a more radical approach is now needed.

As I write this I have just returned from the Pyrenees. We were walking through high alpine meadows that were full of wildflowers. The meadows were alive with insects – butterflies including skippers, fritillaries, arguses, ringlets, blues and many others. Bees were buzzing and several species of grasshopper giving a constant background soundtrack. Overhead were flocks of alpine chough, griffon vultures and the occasional lammergeyer. At one site we were lucky enough to see a wallcreeper – a first for me, despite many times searching for them. In a nearby valley lives a small population of re-introduced brown bears. Alongside this bountiful nature is a farming community, with flocks of sheep and cows in many areas, their bells adding to the soundtrack of the hills. The area also has a thriving tourist industry with large numbers of walkers enjoying the many marked trails and staying at the numerous mountain huts (a cold beer at 8000 feet is very welcome after a steep climb!).

I'm back now in my home patch of mid Wales. The contrast is both

spectacular and depressing. As I walk across our 'sheepwrecked[1]' hills I see almost no flowers. There are no bees buzzing, grasshoppers chirruping or butterflies flying and the silence is eerie. Very few flowering plants are evident and the hill has an overall greyish green hue. And this is in a supposed protected 'Site of Special Scientific Interest'. I have surveyed and studied these hills for the last 30 years or so but I hadn't really realised the extent of our losses until we carried out a systematic survey a couple of years ago.

Species	1984	2011	% change
Black-headed Gull	65	0	- 100
Cuckoo	8	0	- 100
Ring Ouzel[3]	7	0	- 100
Teal	5	0	- 100
Redstart	3	0	- 100
Chaffinch	2	0	- 100
Curlew	2	0	- 100
Coot	1	0	- 100
Kestrel	1	0	- 100
Mallard	1	0	- 100
Mistle Thrush	1	0	- 100
Stonechat	1	0	- 100
Golden Plover[4]	13	1	- 92
Common Sandpiper	10	1	- 90
Pied Wagtail	8	1	- 88
Whinchat	21	4	- 81
Grey Wagtail	4	1	- 75
Wheatear	49	16	- 67
Skylark	287	134	- 53
Willow Warbler	2	1	- 50
Red Grouse	27	14	- 48
Wren	5	3	- 40
Buzzard	1	1	0
Peregrine	1	1	0
Swallow	1	1	0
Tree Pipit	2	3	+ 50
Canada goose	0	1	+ 100
Hen Harrier	0	1	+ 100
Reed Bunting	0	1	+ 100

The site was surveyed in 1984 as part of a UK-wide upland bird survey programme. The area was walked by transect and all birds were recorded. In 2011, as part of a wider PhD study of upland changes, the whole of the area was re-surveyed using the same transect methods[2]. The results were shocking – 12 species had become extinct across the site, with only three new species recorded. Of the remaining species there were declines in all counts.

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Hen harrier *Circus cyaneus* Boda tinwyn

It is not just in my patch where this is occurring – across the Welsh uplands many species are in serious decline. Birds are the most well documented, but there are very few patches in Wales that can get close to the diversity of plants and insects that we found in the Pyrenean pastures. The few better pockets tend to be nature reserves that are being managed, though management is generally aimed at a few species rather than trying to create self-sustaining ecosystems.

Causes and effects

The situation in the Pyrenees is not all rosy of course – we saw areas of overgrazed land, conifer plantations and the like, but even in intensively grazed pastures with few flowers visible there was still reasonably abundant insect life (and quails calling). The reasons for the drastic collapse of our upland ecosystems – for that's what it is – are unclear, and, like all things ecological, are probably a combination of factors. The bird surveys show that many of the species that have declined are insect eaters. Several black-headed gull colonies around the periphery of the site have also completely gone,

A Pyrenean meadow full of flowers, and the Welsh uplands – the contrast is stark

indicating that invertebrate food supply may be an issue. The PhD study, of which the above surveys were a part, was also looking at broad scale vegetation changes over the site since 1984. The results show that there have been no major changes, although the data available meant that exact species composition could not be looked at. Overgrazing has long been a bugbear for conservation. Despite reductions in sheep numbers the lack of flowering plants is evident. (If you look closely then some of the species are still present in the sward, but there are no flowerheads). We are still not doing enough to allow recovery.

Other issues such as acidification and climate change are also candidates for blame: with an already heavily damaged ecosystem their effects may be greater than they would be on a more resilient ecosystem. Unfortunately, for many species groups such as insects we can't conduct the type of repeat surveys undertaken for birds as we have no baseline and are unlikely to get any new baseline surveys against which to judge future changes. Ecological survey seems to have gone out of fashion with Welsh Government, despite the vital importance of long term ecological data sets to tell us of the reality or otherwise of perceived changes in populations.

Wales' upland habitats are internationally important and include upland grasslands, heathlands, woodlands and bogs. Currently approximately 60% of upland habitats are in unfavourable condition, with blanket bog and heath failing at a high percentage of sites[5]. There are also indications that climate change may have caused many upland peatlands to be close to the tipping point between carbon sink and carbon source.

Hope for the future

So what are we going to do? Whilst our designated upland sites all have management plans, and a large number of them are under agri-environment agreements, it is clear, and has been for a long time, that these are not working. The land needs a different approach to help it recover and be more productive and resilient.

There are a few corners showing some hope. I can take you to places across Wales where grazing, especially sheep grazing, no longer occurs for a variety of reasons. Without exception these ungrazed or lightly grazed areas have improved beyond all hope. The structure and diversity of the communities have developed and more species are present. As George Monbiot states[1], why should we expect our

ecosystems to thrive when eaten to death by 'Mesopotamian ruminants'!

I can take you to a hill grazed by a small herd of ponies, where trees have grown up on the 'Ffridd' slopes (the often bracken-dominated land between enclosed farmland and mountain) and, in areas that were mainly dominated by purple moor-grass, bilberry is now establishing itself in the tussocks and is out-competing the unpalatable grass. Overall the wildlife is thriving compared with the 'sheepwrecked' hill next door. The Ffridd is full of tree pipits, willow warblers, redstarts and the like. On the blanket bog, plant communities are thriving and a hen harrier was seen recently.

On another site, where there appears to be no grazing, vegetation has been quick to re-establish itself, despite the slow nature of change in the uplands. I can now walk through the site and see plants in flower – a rare sight a few years ago. Alpines not recorded in places for years have suddenly re-appeared – presumably repressed by grazing though hanging on out of sight under other vegetation. Evidence of small mammals is everywhere and bumblebees are feeding on the blossoms.

Hidden within forestry plantations there are bogs that haven't been managed or grazed for decades. These are some of the best, most diverse-looking bogs I can find – heather and bilberry are allowed to flower, cranberry is common and sundew thrives in the wetter areas. These and other examples show that 'conservation grazing' can be a contradiction in terms and that communities can thrive outside of human (and especially agricultural) control.

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Ring ouzel *Turdus torquatus* Mwyalchen y mynydd

This move to allow ecosystems to manage themselves is an approach that is now gaining momentum – it is known as 'rewilding'. It is all about stepping back and letting nature recover. The key aims are[6]:

- Reverse the loss of biodiversity in large, core areas of land and sea;
- Restore ecosystems to a functional and resilient state;
- Where appropriate, reintroduce key missing species, including the lynx and wolf;
- Reignite people's passion for the natural world;
- Revitalise local economies in ways that work ecologically;
- Reintegrate nature and society for the benefit of both.

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Skylark *Alauda arvensis* Ehedydd

Large-scale restoration of natural processes is not a threat to wildlife, nor agricultural interests, local communities or economies. It cannot be forced – it will only take place under sympathetic ownership, but there must be a move in subsidies to enable it to happen where it is wanted. There are many areas of Britain, especially in the uplands, where farming is, and is likely to continue to be, uneconomic. It is only maintained by subsidy. Why should that subsidy not be directed to restoring more natural ecosystems where landowners want to go down this path? This would require changes in the European Common Agricultural Policy rules in the long term, but much can be achieved if the Welsh Government made changes in how they use monies in schemes such as Glastir, where they have some flexibility, which would help them deliver the aims of the recent Well Being of Future Generations Act in creating resilient ecosystems.

There will always be cultural habitats, such as hay meadows, Rhos pasture or coppice woodland, that are valuable for both their diverse wildlife as well as for their human connections. Nobody is asking to 'abandon' these, or other valued pockets, but isn't it time we at least tried to let Nature have the upper hand where we can? We should stop trying to 'restore' some artificial version of nature but instead try and let nature establish sustainable areas of resilient ecosystems. Yes, relative abundance of species will change but you cannot freeze nature,

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Willow warbler *Phylloscopus trochilus* Telor yr helyg

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Tree pipit *Anthus trivialis* Corhedydd y coed

especially in its current very impoverished state. We need to move from the command and control model and give nature some space.

***Mick Green** is an independent ecologist and a Trustee of 'Rewilding Britain'.*

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Ucheldiroedd Cymru

Mae cynefinoedd ucheldiroedd Cymru o bwys rhyngwladol ond mae oddeutu 60% ohonynt mewn cyflwr anffafriol. Mae'r cyferbyniad â dolydd llawn blodau'r Pyreneau yn drawiadol a digalon, gydag ychydig o flodau neu infertebratau i'w cael yn ucheldiroedd Cymru. Dengys arolygon adar o 1984 a 2011 fod 12 rhywogaeth wedi diflannu drwy safle'r arolwg a bod gostyngiad difrifol yn niferoedd y rhywogaethau eraill. Mae setiau data ecolegol hirdymor yn hanfodol er mwyn deall unrhyw newidiadau, ac eto ychydig o ymrwymiad a geir gan y Llywodraeth i fuddsoddi ynddynt. Mae nifer o ardaloedd yn dal yn cael eu gor-bori'n ddifrifol, ac mae asideiddio a newid hinsawdd yn ychwanegu at y broblem.

Mae angen defnyddio dulliau gwahanol er mwyn helpu i adfer y tir. Pan fo pori wedi darfod, mae'r tir ac amrywiaeth y rhywogaethau wedi gwella tu hwnt i bob disgwyl, sy'n dangos fod cymunedau yn gallu ffynnu os na chânt eu rheoli gan bobl ac amaethyddiaeth. Ceir sawl ardal lle mae ffermio yn aneconomaidd, ac yn cael ei gynnal gan gymhorthdal yn unig - oni fyddai'n llawer gwell gweld y cymhorthdal hwnnw yn cael ei gyfeirio'n uniongyrchol at adfer ecosystemau naturiol.

Planhigion Meddyginiaethol Meddygon Myddfai

Yn Natur Cymru *46 ysgrifennodd* ***BETHAN WYN JONES*** *am y defnydd meddygol a wnaed o blanhigion yn y gorffennol. Yma mae'n bwrw golwg eto ar argymhellion a ryseitiau Meddygon Myddfai o'r 14eg ganrif.*

Lluniau/All photos: Bethan Wyn Jones

Saets *Salvia officinalis* Sage

Meddygon Myddfai oedd Rhiwallon a'i feibion Cadwgan, Gruffudd ac Einion, ac yn ôl Chwedl Llyn y Fan Fach, roedd Rhiwallon yn fab i'r ferch hardd a gododd o'r llyn ac a rannodd ei gwybodaeth am blanhigion meddyginiaethol gyda'i mab. Yn anffodus chwedl yw hon a does dim sail i'r dybiaeth fod Meddygon Myddfai yn ddisgynyddion iddi, ond roedd yna feddyg o'r enw Rhiwallon ac roedd ef a'i feibion yn feddygon i Rhys Gryg.

Roedd Rhys Gryg yn fab i Rhys ap Gruffudd, ac roedd Rhys ap Gruffudd hefyd yn cael ei adnabod fel yr Arglwydd Rhys o'r Deheubarth. Maen wybyddus fod y teulu hwn o Ddinefwr yn gefnogol i'r celfyddydau ac i addysg, felly mae'n gwbl bosib y byddent hefyd wedi annog dysgu am faterion meddyginiaethol yn ystod y ddeuddegfed a'r drydedd ganrif ar ddeg.

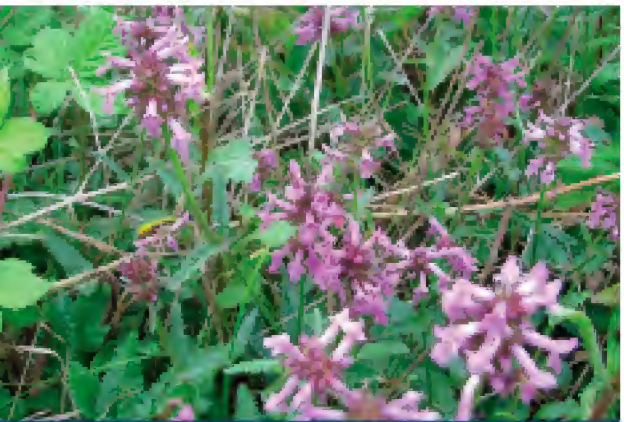
Mae gwaith Meddygon Myddfai ar gael i ni heddiw drwy *Lyfr Coch Hergest* yn bennaf, sy'n dyddio o ran olaf y bedwaredd ganrif ar ddeg a rhai llawysgrifau Cymreig eraill. Yr hyn sydd yma yw dynion dysgedig oedd yn amlwg wedi astudio materion meddyginiaethol ac wedi nodi meddyginiaethau at wahanol afiechydon. Mae yma hefyd restr o blanhigion meddyginiaethol defnyddiol.

Mae'n rhaid i mi ei wneud yn hollol glir nad ydw i'n darllen Cymraeg Canol, ac felly rydw i'n gwbl ddibynnol ar y testun o *Lyfr Coch Hergest* a olygwyd a'i ddiweddaru gan y Parchedig John Williams, neu ab Ithel i roi ei enw barddol iddo, oedd yn rheithor Llanymawddwy. Yn 1856 fe wnaeth John Williams baratoi *Medical Practice of Rhiwallon and his Sons* ar gyfer y Welsh MSS Society, ac o'r gwaith hwn mae modd dilyn y testun, er fod sawl enw a ddefnyddir ar blanhigion yn wahanol i'r hyn a ddefnyddir heddiw.

Un o'r planhigion y cyfeirir atynt yng ngwaith Meddygon Myddfai yw cribau san ffrêd neu gribau San Ffraid (*Stachys officinalis*; Betony). Dyma un enghraifft:

66 – Rhag gwlybwr llygaid
Cymer flodau cribau sanffraid, a bwyta hwy, a hynny a loywa'r llygaid, ac a'u sychant yn loywon

Enghraifft arall yw:



Cribau San Ffraid *Stachys officinalis* Betony

266 – I ddyn a fytho'n dywedyd trwy ei gwsg [sef rhywun sy'n siarad drwy'i hun]
Cymer beint o sudd cribau sanffréd, a pheint o fercris, a'u cymysgu ynghyd a'i yfed, a hynny wna les trwy Dduw

Mae'r cymal *"A hynny a wna les trwy Dduw"* ac ambell un arall fel – "ag iach y byddi drwy Dduw" yn un sydd i'w gweld dro ar ôl tro yn y gwaith. Mae'n rhaid cyfaddef ei bod yn un o'r ymwadiadau gorau i mi ei chlywed. Yn amlwg os nad oedd y rysâit yn gweithio, yna nid y meddyg oedd ar fai ond Duw!

Enwau eraill Cymraeg ar gribau San Ffraid, yw danhogen, dwyfog a'r feddyges lwyd, ac mae'r enw olaf yna yn rhoi cliw i ni. Mae'n un o'r planhigion sydd wedi ei ddefnyddio fel planhigyn meddyginiaethol ers canrifoedd.

Defnyddiwyd sawl rhan o'r planhigyn: defnyddid y gwreiddiau fel carthydd cryf ac emetig. Roedd y dail wedyn yn gwbl wahanol - yn ôl ambell i gofnod, mae modd gwneud diod feddwol gyda'r dail. Mae tystiolaeth fod dail cribau San Ffraid wedi'u defnyddio i drin clwyfau, at losgiadau ar y croen ac i wneud tonig. Fel arfer roedd trwyth yn cael ei baratoi o'r dail, a hwn wedyn yn cael ei yfed fel te, a chredai pobl ei fod yn dda at glirio'r gwaed.

Roedd yn cael ei ddefnyddio at gamdreuliad, at gur pen, ac at y meigryn. Fe'i defnyddid hefyd at anwyd a pheswch ac mae'n bur debyg ei fod yn cael ei ddefnyddio i glirio'r ffroenau. Defnydd arall oedd yn cael ei wneud ohono oedd fel sedatif, ac mae tystiolaeth iddo gael ei ddefnyddio i dynnu penddyn neu gornwyd. Yn ôl pob sôn, roedd yn blanhigyn oedd yn bwysig i'r Eingl Sacsoniaid ac roedd cysylltiaid â dewiniaeth yn perthyn i'w defnydd ohono. Ond roedd rhai â chymaint o feddwl ohono a'i rinweddau meddyginiaethol nes i ni gael y dywediad – "gwerth dy gôt a phryn gribau San Ffraid."

Un arall o'r planhigion y ceir nifer o gyfeiriadau ato yn y gwaith yw'r saets (*Salvia officinalis*; Sage) neu'r 'geidwad' fel roedd y Meddygon yn cyfeirio ato. Dyma un enghraifft:

100 Cyfleth rhag genau dolurus
Cymer lwyaid o sudd y geidwad, a llwyaid o sudd yr ysgaw, a dwy lwyaid o sudd mwyar gleision, a bywyn afal poeth, a thair llwyaid o fêl, a berw ar dân araf gan gymysgu yn ddi-baid onid elo'n gyfleth tew, dod mewn blwch pridd a chau arno'n dda a'i gadw at achos, a phan fo dolurus y genau, cymer faint wy colomen a dal yn dy enau oni thoddo, a da yw.

Fel y gellir gweld, mae cyfeiriadau at nifer o wahanol blanhigion yn y rysâit hon ac mae hynny'n wir am y mwyafrif o'r rysetiau a geir yng ngwaith y Meddygon. Diddorol hefyd yw'r cyfarwyddiadau ar faint ohono a ddylid ei ddefnyddio yn y geg – sef, "maint wy colomen".

Mae saets wedi'i ddefnyddio dros y canrifoedd ac rydym yn dal i'w ddefnyddio i goginio ac mae'n ddigon cyffredin yn y gerddi. Er, mae 'na goel na ddylech chi byth blannu saets eich hun yn eich gardd, am fod yna lwc ddrwg yn siŵr o ddilyn os y gwnewch chi, ac y dylech chi gael dyn diarth i wneud hyn drosoch chi. Mae 'na gred hefyd na ddylai'r saets ddim gael i blannu ar ei ben ei hun mewn gwely, ond ei fod o angen planhigyn o rywogaeth arall yn gwmni iddo yno.

Perthyn i deulu'r mintys mae'r saets ac mae wedi'i ddefnyddio ar gyfer haint yn y geg a'r llwnc. Mae modd ei ddefnyddio i garglo os oes gennych ddolur gwddw. Mae hefyd yn donic i'r corff ac yn gwella cylchrediad y gwaed.

Perthynas i'r saets sy'n tyfu'n wyllt ar y cloddiau yw

Milddail *Achillea millefolium* Yarrow

chwerwlys yr eithin (*Teucrium scorodonia*; Woodsage). Unwaith eto mae gan y Meddygon enw arall arno, sef chwerwyn y twyn. Dyma i chi un rysáit sy'n cael ei gynnig ganddynt at yr 'Iddwyf' neu'r Tân Iddew, sef Erysipelas, sy'n haint ar y croen ac yn achosi cochni amlwg ar y croen – fel tân ar groen.

94 Plasder rhag yr Iddwyf, ag i dynnu cig drwg
Cymer sudd chwerwyn y twyn a mêl wedi ei gymysgu â halen ag aesel, a chymysg yn dda, a dod amcan o flawd rhyg, a berw a gwna blaster, a dod wrth y clwyf, ag arfer y plaster ar ddiod a ddywedwyd ei fod yn dda rhag y gwst mawr hyd onid el yn iach.

Mae chwerwlys yr eithin hefyd wedi ei ddefnyddio at anhwylderau'r stumog. Yn yr Iwerddon yn arbennig mae o wedi ei ddefnyddio ar gyfer colig, crafangu yn y stumog a diffyg traul. Ceir tystiolaeth iddo gael ei ddefnyddio yn Sir Feirionnydd fel tonig. Mae'r planhigyn yn gwneud i rywun chwysu, ac felly wedi ei ddefnyddio i ostwng gwres, ac mae wedi ei ddefnyddio i drin anwyd a pheswch, gan

Un planhigyn nad oes llawer o gyfeiriadau ato yw'r milddail (*Achillea millefolium*; Milfoil neu Yarrow) sy'n rhyfedd gan fod nifer o gyfeiriadau at y milddail mewn llyfrau Cymraeg llawer mwy diweddar. Un sy'n cael ei gynnig yw:

125 - Rhag y tostedd a'r maen [carreg oedd 'maen']
Cymer y milwydd a'r tormaen, a phwya hwy am ben d r twym, a dyro'n ddiod i'r claf chwe diwrnod yn llynn, ag nac yfed arall o ddiod ag iach a fydd trwy Dduw.

Mae o leiaf wyth gant o wahanol rysetiau gan Meddygon Myddfai yn y gwaith a rhai yn fwy defnyddiol na'i gilydd. Tybed fyddai un o'r ddwy rysáit yma o ddefnydd i chi?!

461 Rhag meddwi
Cymer ddyrnaid o'r bittan, a elwir cribau sanffrêd (Stachys officinalis; Betony), a phwya hwy'n dda a chymysg â ddˆwr ffynnon, a hidla'n lan, a'i yfed cyn bwyta nag yfed dim arall, ag ni feddwi y dydd hwnnw.

508 I beri i'r gwallt dyfu
Eillia'r pen yn lân ag ellyn, a chymer fêl a sudd gwynwyn (nionyn neu winwnsyn) , gymaint dra chymaint, ag â hwnnw elïa'r pen a rhiglo'n dda bob bore, a phob nos golch y pen a distyll mêl; profedig yw.

Mae ***Bethan Wyn Jones*** *yn cyfrannu'n rheolaidd i'r Galwad Cynnar ar fore Sadwrn ar Radio Cymru, ac mae ganddi golofn bob wythnos am wahanol agweddau ar fyd natur yn Herald Cymraeg y Daily Post. Cyhoeddodd sawl llyfr gan gynnwys cyfres* Doctor Dail *a chyfres* Cynefin *ar y cyd â Iolo Williams.*

The Physicians of Myddfai's Medicinal Plants

The Physicians of Myddfai are mentioned in both fable and fact. The fable can't be verified, but the Physicians' medicinal knowledge is recorded in the 14th century *Red Book of Hergest*, and includes a list of useful medicinal plants. Betony, for example, has been valued as a medicinal plant for centuries, as shown by one of its Welsh names, *feddyges lwyd* (*meddyg* meaning 'physician'), and was recommended as a cure for anything from sleep-talking to indigestion to blackhead removal. Sage and its wild relative, woodsage, are recommended for throat infections, inflamed skin, indigestion and to improve blood circulation, while yarrow is particularly helpful for kidney stones.

Many of the Physicians' recipes end with an invocation to the grace of God to bring about a cure – a way of absolving themselves from blame if the cure did not work!

A full translation of this article is available on our website ***www.naturcymru.org.uk****, or by request.*

BBNPA

The Black Mountains - not such a black future

Protecting the bare peat

In 2014 the Welsh Government made available a £6 million Nature Fund to tackle declining biodiversity and deliver benefits to communities, with river catchments and the uplands as two of its priorities. ***BRADLEY WELCH*** *reports on how some of this money has been used to halt erosion in the Black Mountains, to benefit both people and wildlife.*

The Brecon Beacons National Park (BBNP) is an iconic and inspiring mix of upland and lowland landscapes, shaped by the interactions of people and nature over the course of time. Indeed, the National Park designation celebrates the character of this living, working landscape as defined by the biological, geological and cultural features that we experience today. But increasing societal pressures and the complex interaction of these forces, if unbalanced, can erode the Park's character, leading to the loss or impairment of habitats and species, changes in ecological processes, and a decline in the cultural heritage of the land. Where imbalances have occurred they have resulted in ecosystem degradation, and upland habitats are particularly susceptible to disturbance because pressures are often exacerbated by extreme environmental conditions.

In 2014 the BBNP Authority submitted a successful bid to the Welsh Government Nature Fund on behalf of the Black Mountains Graziers, Glanusk Estate, Tregoyd Estate, Bal Mawr/ Bal Bach Estate, Duke of

Beaufort Estate, Michaelchurch Estate, Ffwddog Estate, Natural Resources Wales (NRW) and Welsh Water. These parties joined forces with the National Trust, who have been restoring upland habitats on the neighbouring Sugar Loaf Woodlands Special Area of Conservation (SAC), and ADAS Cymru, who assessed the state of peatland resources across the National Park in order to inform future conservation priorities.

The Black Mountains

The Black Mountains comprise areas of upland and lowland ecosystems in the north-eastern corner of the National Park, covering some 15,000 hectares. The area includes more than 10,000 ha of common land on the Welsh Black Mountains, contiguous with upland grazing land in England. Waters emerging from associated upland habitats, particularly blanket bogs, ultimately flow into several regionally important rivers and streams supporting salmonid fisheries and numerous other species and habitats. These systems become part of the rivers Usk and Wye, which are designated SACs for their important riparian features. Thus, what affects the uplands also impacts the lowlands, as well as the biodiversity in between.

Within this landscape, the Black Mountains Site of Special Scientific Interest (SSSI) extends for 6,783 ha in Wales. This site is designated to protect several natural upland features, including blanket bog, calcareous grassland, dry heath, flush and spring, natural inland rock exposures, screes and upland ledges, semi-natural scrub and woodland, vascular plants, the Silurian moth *Eriopygodes imbecilla* and a diverse breeding assemblage of upland bird species such as red grouse *Lagopus lagopus scotica* and golden plover *Pluvialis apricaria*.

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Golden plover *Pluvialis apricaria* Cwtiad aur

Roy Leverton

The rare Silurian moth (*Eriopygodes imbecilla* Gwyfyn Gwent) is found only in the Brecon Beacons and one other location in the UK

So why all the fuss?

Significant areas of the SSSI are in unfavourable condition, owing to a complexity of factors. Recreational pressure, erosion from illegal motorbike use, atmospheric nitrogen deposition, inconsistent grazing patterns, uncontrolled burns, climatic changes, altered drainage, and a decline in active heather management generally, have all led to a reduction in the extent of dry heath and a decrease in the quality of the blanket bog. Blanket bog, flush and spring habitats are very sensitive to compaction, erosive forces and other impacts. Several vascular plant species, rare mosses and lichens, and upland bird species – particularly ground nesting birds – are also susceptible to disturbance. Current levels of *Molinia*-dominated wet heath and blanket bog can be attributed to uncontrolled burns, the drying of bog, atmospheric pollution and changes in grazing practice, both under- and over-grazing. Most steep-sided slopes are bracken-dominated, reflecting historic changes to livestock management.

Visitor pressures have contributed to path erosion in areas such as Waun Fach (the highest point of the Black Mountains at 810m), exacerbated by a lack of well-defined paths across the bog. The Waun Fach—Pen Trumau area includes the largest area of exposed peat in South Wales. Though gullies and areas of eroded peat extend well beyond this area, the exposed peat at Waun Fach covers about 20ha

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1,700 tonnes of material was airlifted to create footpaths and protect the peat

and is devoid of intact peat-forming vegetation. The estimated volume of peat eroded each year from Waun Fach is 1000m^3, equivalent to approximately 880 tonnes of peat, 100 tonnes of carbon or 368 tonnes of carbon dioxide. This eroded peat makes its way into the catchments of the Usk and the Wye: increased colouration of the water led to Grwyne Fawr Reservoir being abandoned as a domestic water supply in 2004.

Making the most of our resources

In November 2014, we were informed that, although successful, our project would receive only one-fifth of the funding requested in our original proposal. We also learned that the project delivery window required practical works to be completed between January and April 2015, before the advent of the breeding bird season. Welsh Government asked us to examine plausible alternatives and submit a revised proposal, requiring us to reduce the scale of implementation and eliminate elements such as bracken control that were constrained by seasonality. Consequently, we focused resources on the initial practical conservation works at the top of the catchment – on Waun Fach – and simultaneously developed the tools and relationships that would provide for the long term, sustainable management of the Black Mountains. Parallel projects conducted by the National Trust and ADAS Cymru were similarly adjusted to reflect resource constraints.

Final project objectives included:

- development of a long term land management partnership to seek additional funding to implement management priorities within the area;
- development of a 10-year bracken control plan;
- restoring vegetative cover, stabilising peat resources and controlling erosion on Waun Fach;
- implementing a coordinated programme of heather management and *Molinia* harvesting to provide a source of materials for restoration works;
- carrying out gorse cutting at strategic locations;
- production of an education programme designed to tell the story of traditional and contemporary grazing, and other upland management practices

What we've achieved so far

Despite an unusually cold, snowy and windy March in 2015, contractors, land owners, agencies, staff and volunteers persevered through long hours and in miserable conditions to transport materials onto Waun Fach and to implement restoration works. It took more than 1000 airlifts of 1,700 tonnes of materials to complete over 2.2 km of footpath and treat 3,200m^2 of bare peat. Ten people-counters were installed to monitor visitor movements, nine dip wells installed via NRW funding, and over 180m of gullies were blocked, with the bare peat around the gullies covered in heather brash. Over 3 ha worth of heather and *Molinia* arisings from nearby moorland management projects were used in these initial conservation efforts, and over 1 ha of gorse was cut to improve rides leading up to the hill fence.

Outputs from the bracken control plan have exceeded expectations. Contractors created a set of options ranging from long-term, low input control methods to a more short-term, high input approach. Each option was mapped across the Black Mountains using relevant GIS data to optimise the various scenarios. Each option was also timetabled with a relevant sequence of actions and geographic priorities. Indicative costs were calculated to aid future funding efforts to be pursued by the Partnership.

To celebrate what we had achieved and to help others understand the relevance of upland farming and conservation to the Black Mountains, the

BBNPA

Blocking the drainage ditches enables the bog to re-form

National Park Authority Education Team developed teaching modules. These were rolled out in Welsh and English to almost 600 students aged 7-16 in 12 local schools. The uptake and feedback was positive and encouraging. In future we will aim to involve local school children as ambassadors of upland projects so they can assist in the promotion of sustainable conservation messages.

Underpinning all of this has been the development of the Black Mountains Land Use Partnership, a collaboration of graziers, land owners and relevant organisations which will be instrumental in ensuring the long term success of conservation efforts in the area. These are the people who live, work in and care for the Black Mountains and wish to see its natural resources maintained sustainably. The Partnership will aim to guide priorities for future action and procure funding where possible.

Where do we go from here?

If conservation efforts are maintained and future works continue, Waun Fach should see a dramatic increase in vegetation coverage, resulting in improved grazing quality, expanded upland breeding bird habitat and a better visitor experience, whilst retaining climate-mitigating carbon stores. In just a few months we have already seen vegetation recovering in treated areas alongside the new footpath and adjacent to blocked gullies. Continued monitoring will assess the efficacy of these heroic efforts.

Given realistic timeframes, local materials, dedicated people and appropriate funding, these relatively simple techniques can be employed to achieve desirable results throughout the Black Mountains under the guidance of the Black Mountains Land Use Partnership. There is, for example, strong support from the Partners to implement the bracken control plan, assuming that appropriate funding can be procured.

It is our job as land owners and land managers to conserve and enhance desirable features and functions within this landscape at the same time as identifying undesirable sources of change and managing these within acceptable limits where possible. But in these times of austerity, we cannot do it alone. It is our ambition in the Black Mountains that the partnership we have forged out of the Welsh Government Nature Fund will continue to reap multiple public benefits for the longer term, thus amplifying the project's legacy across the Black Mountains for future generations.

Dr. Bradley Welch *is Senior Ecologist for the Brecon Beacons National Park Authority.*

Y Mynyddoedd Du

Yn 2014, nod Cronfa Natur £6 miliwn gan Lywodraeth Cymru oedd ceisio mynd i'r afael â dirywiad bioamrywiaeth a sicrhau manteision i gymunedau. Mae rhannau helaeth o'r Mynyddoedd Du yn y Bannau wedi dioddef blynyddoedd o ddiraddiad ac erydiad yn sgil pwysau gan ofynion hamdden, defnydd anghyfreithlon o feiciau modur, dyddodiad nitrogen yn yr atmosffer, patrymau pori anghyson, llosgi direolaeth, newidiadau yn yr hinsawdd ac mewn draenio. Mae'r mynyddoedd yn rhan o ddalgylch dŵr afonydd Wysg a Gwy, sy'n afonydd pwysig, ac mae'r hyn sy'n digwydd i fyny'r afon yn effeithio ar yr hyn sy'n digwydd i lawr yr afon. Maen nhw hefyd yn gynefin i nifer o rywogaethau prin.

Mae cais llwyddiannus am arian wedi hwyluso gwaith i adfer y cynefinoedd. Er gwaethaf tywydd gaeafol digon diflas, aeth y gwaith yn ei flaen i amddiffyn mawn moel gan ddefnyddio grug, gwaith blocio gyl'iau, adeiladu llwybrau cerdded a thocio eithin. Datblygwyd sawl modiwl dysgu i helpu i egluro pwysigrwydd y gwaith hwn i ymwelwyr a chymunedau lleol.

Neil Ludlow

One farm's flora: 30 years on

2015: looking south-west across the farm

***NEIL LUDLOW** grew up on a flower-rich smallholding in Carmarthenshire. In a previous article he has described how, thanks to an inspiring teacher, he learnt and recorded the names of the wildflowers in each field on the farm. Many years later he has returned to see how the flora has fared, and to face the dislocation between memory and reality which time has wrought.*

Revisiting a fondly remembered former home after a long gap can be an emotional experience; disorientating, too, if a lot of changes have occurred. When I was invited to write a follow-up piece to 'One Farm's Flora' (*Natur Cymru* 48, Autumn 2013), to bring the story up to date with a current description of my family's old farm, I was fully aware that it might provoke mixed feelings. But curiosity won out in the end.

My teenage years in the 1970s were spent on a smallholding in the Gwendraeth Valley, on which we kept a small herd of Channel Island cattle. Its 5.8 ha (14.5 acres) occupied the gentle, south-facing slope of a Carboniferous limestone ridge forming the very edge of the South Wales coalfield. Six small fields, all unimproved pasture with tall wooded hedgebanks, offered a range of habitats – including valley-floor marshland – which sustained over 130 species of flowering plant (in addition to those tree species, and most grasses, sedges, umbellifers and composites, which I then lacked the confidence to identify). Our approach was, by default rather more than by any design, almost entirely non-

intensive. We stopped active farming in 1980 but my parents, though obliged by my father's job to live mostly abroad, held on to the property until 1994 and leased the fields for low-intensity grazing.

My return visit on 9 July 2015 was the first time that I'd properly explored the farm in nearly 30 years, so I was naturally intrigued, if a little apprehensive, about the changes that might have occurred. What had happened in the meantime? Well, the village has changed a bit, but mostly on a superficial level; it's undergone some of the inevitable gentrification of the last 15 years and is certainly a bit smarter, if less recognisably 'local' in appearance, and different enough to feel rather unfamiliar. New development in the village has yet to have much effect on the farm or its immediate environs. It is, however, under several ownerships and tenancies, and land-use is decidedly mixed. The main difference is that the land is no longer under permanent grazing by cattle, affecting the six fields – and their floras – in different ways. And the hedgebanks in the main no longer appear to be stock-proof, meaning that grazing is now restricted to fenced-off areas.

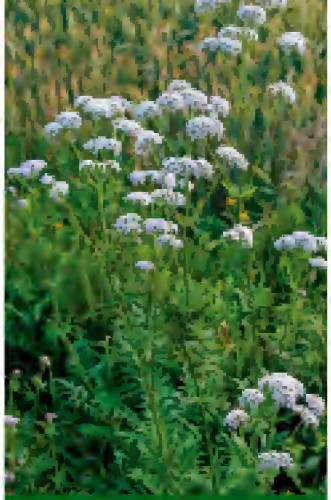
The field closest to the farmhouse seems to support the same overall flora, in which leguminous plants flourish, as they did in the 70s; although no livestock were present when I visited, it had clearly been grazed in the recent past. It was probably a little too early in the year to establish whether common centaury *Centaurium erythraea* persisted here. The adjoining field had been one of our two hay fields (each with an annual cut); it is now grazed rotationally by a mixture of livestock, controlled by post-and-wire fencing. In this field, however, the impact of new regimes appears likewise to have been relatively slight.

The next field in line, which was the second of our hay fields, had clearly been ungrazed for many years and now shows extensive rush-growth. It's currently being grazed, again rotationally, by a small flock of sheep controlled by post-and-wire fencing. The wooded stream along the boundary still supports dense stands of brooklime *Veronica beccabunga*, and other semi-aquatics. But a gravel trackway has been recently laid along the opposite margin of this field. It leads down to a fourth, steeper field which formerly displayed a range of wildflowers, including common restharrow *Ononis repens*, and used to be thick with puffballs in early autumn. In the absence of regular grazing, the bracken that always lurked in the lower slopes has taken a firm hold, spreading through much of this field. An assemblage of sheds now occupies the top of the field and future plans for this area are unclear. Bracken has also extended into the adjoining field, to the west, which leads down to the valley floor and the sixth field.

Neil Ludlow

The bottom marshy field in 2015, with invasive willow scrub

This is where the most change has occurred. Formerly undrained marshland, alongside a small tributary of the Gwendraeth Fawr, it was occasionally grazed and supported a rush and tussock-grass community. It also featured – in succession – drifts of lady's smock *Cardamine pratensis*, ragged robin *Lychnis flos-cuculi*, common spotted orchid *Dactylorhiza fuchsii*, devil's-bit scabious *Succisa pratensis* and meadowsweet *Filipendula ulmaria*, among a variety of other damp-loving wildflowers. Long ungrazed, half of the field has been taken over by willow scrub and brambles within which, in the recent past, a number of ponds have been dug out to create a chain of water-features; the other half now lies beneath a metre-thickness of hardcore and made ground. This increase in wetland, still-water habitat, while somewhat shaded, may well prove to be of great benefit to aquatic fauna, invertebrate and vertebrate, but much of the distinctive flora seems to have been entirely lost. However, common



Christian Fischer

Common valerian (*Valeriana officinalis* Llysiau Cadwgan) still flourishes after 40 years

valerian *Valeriana officinalis* still flourishes alongside the tributary stream.

An assemblage of old stone outbuildings next to the farmhouse has survived more or less unchanged, and any restoration work appears to have been superficial; the buildings seem to support the same flora of stonecrops and ferns as they did in the 1970s. A small paddock beneath the farmhouse, in which we'd kept chickens and geese, has however succumbed to the hard vegetation that we'd barely managed to control in the past, and is now densely overgrown and semi-wooded. So the oxeye daisies *Leucanthemum vulgare* which grew here, and which were not then common in the locale as a naturally occurring plant, will probably have been lost.

So the impact of changes in tenure and management has been mixed. I didn't get the opportunity on this single visit to do an updated species count, but my feeling is that the three upper fields have been the least affected and may retain most of the flora recorded during my schooldays. None of the fields has been agriculturally improved – quite the opposite, in fact – but the lengthy suspension of grazing in the lower fields has clearly affected the composition of the floral assemblage. The 're-wilding' of the marshy field, though perhaps incidental, has provided an entirely new habitat which in the long term may turn out to be no bad thing, but landscaping work here seems to be on hold and is possibly incomplete. And two entirely new species have appeared here – viper's bugloss *Echium vulgare* and large evening primrose *Oenothera glazioviana*. Neither is indigenous to the Gwendraeth Valley and both have presumably hitched a ride on the imported hardcore.

Overall the visit provided interest, some reassurance and inevitable regret. But my main feeling was one

Bernd Sauerwein at German Wikipedia

Large evening primrose (*Oenothera glazioviana* Melyn-yr-hwyr mawr) was not previously found on the farm

of disorientation – strangely enough, it made memories of the farm more difficult to access, rather than easier. Trying to recover them, I drove past some of my teenage haunts including the school where I first learned to appreciate wildflowers. I felt, in a way, that my reaction might have been less complicated if the farm had come to lie beneath a housing estate or industrial park: the memories would then have been preserved intact. Instead, it was a strange mix of the familiar and the highly unfamiliar, while favourite corners no longer existed. But this is purely a personal reaction, and hardly rational. Nor are all the changes necessarily for the worse. The farm remains undeveloped, the land is still unimproved and new habitats have been created: the story is far from over.

***Neil Ludlow** is an archaeological consultant. Though now living in Hampshire, his main interests still lie in medieval Wales.*

Fflora un fferm: 30 mlynedd ymlaen

Pan oedd yn ei arddegau yn y 1970au cofnododd Neil Ludlow y blodau gwyllt mewn chwe chae ar fferm ei deulu yn ne Cymru. Ddeugain mlynedd yn ddiweddarach ail ymwelodd ac, yn anorfod, gwelodd newidiadau. Doedd yr un o'r caeau wedi'u gwella'n amaethyddol, ond mae diffyg pori mewn rhai mannau wedi arwain at lawer mwy o frwyn, rhedyn, prysgwydd helyg a mieri, gan arwain at golli rhywogaethau o flodau gwyllt. Roedd nifer o byllau wedi'u cloddio mewn un cae corslyd a allai fod o les i fywyd y dŵr yn y tymor hir. Mewn rhywogaethau newydd wedi ymddangos mewn mannau eraill, wedi'u cael eu cario, o bosibl, gyda'r gro mân ar gyfer y tirlunio sy'n gorchuddio rhaimannau. Ar y cyfan mae'n beth positif fod y tir yn aros heb ei wella ac wedi'i dan ddatblygu.

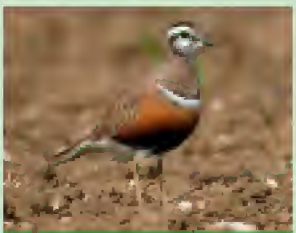
B Jones

Something like tundra...

unique Welsh highland habitat

High pressure habitat: fragile tundra on Y Garn is sensitive to impacts of people and sheep

***JOHN HAROLD** considers the special nature of the highest habitats in Wales, their fragile arctic-alpine connections, and their relevance to current debates in conservation.*



Chris Gomersall rspb-images.com

Dotterel *Eudromias morinellus*
Hutan y mynydd

Visitors to high latitudes and high altitudes in other countries often return to Wales bemoaning our lack of a 'natural tree-line'. What they are really missing is a tundra-forest ecotone, that subtle zone where trees gradually diminish in stature in response to harsher conditions.

The tree-line in Wales is artificial, but it is also misleading. Grazing and fencing create an abruptly truncated false tree-line, and this serves to disguise the existence of a genuine natural tree-line much higher up on exposed ground. Here we find pockets of montane heath. There may be value in looking at these scarce summit habitats as a kind of tundra.

The word 'tundra' comes from *tūndâr*, which is how the Sami people of northern Scandinavia invoke their idea of 'treeless uplands'. Tundra is the land above the tree-line and below the permanent snow-line.

The Arctic tundra biome covers vast areas and is linked to the dynamics

J Harold

Cowberry, bilberry & crowberry: but are these subshrubs in Snowdonia, Scotland or Scandinavia?

of permafrost. Alpine tundra is a more disparate habitat spread across the world's mountain regions; it is found at high altitudes where snow-lie, frost and exposure determine the possibilities for plant growth and specifically exclude growth of trees of any stature.

Something like tundra probably existed in Snowdonia long before the current warm post-glacial period. This makes it one of the most ancient habitats we have. This Welsh tundra is restricted to a few hundred hectares on the highest plateaux in Snowdonia, with a fragmentary outlier on Pumlumon. In global terms, by contrast, Arctic tundra is the world's youngest biome at only c10,000 years old, and accounts for more than 15% of all land-cover; though that figure is declining through thawing of permafrost.

Resilient vegetation

Tundra vegetation comes in many forms, but the common factors are the extreme climatic and edaphic conditions by which it is shaped. Each stand of tundra vegetation is a pick-and-mix of survivor plants from a very short short-list. That list is dominated by mosses, lichens,

J Harold

Tundra habitat in Scandinavia with abundant mountain avens (*Dryas octopetala* Derig). This species is confined to a few calcareous mountain ledges in Snowdonia.

graminoids and sub-shrubs. Such plants must be able to withstand severe winter punishment regimes and short growing seasons.

But Wales has no permafrost and no glaciers. Our 'mountains' barely reach the 1,000m contour. Persistent snow-lie has become a rare event. Unusually, one snow patch on the Carneddau lasted to late June in 2010, but cumulative snow cover is on a downward trend.[1] So can we possibly have something like tundra here?

Anyone who has been on the tops in Snowdonia in an ice blizzard will know how extreme the conditions can be, even with our 'warm and wet' oceanic climate. In summer the persistent wind soon shrivels the rudimentary debris which passes for soil amongst the stone-fields. During prolonged dry spells the mountains turn the colour of straw under desert-like conditions. Torrents of rain lash the ground, depleting available nutrients and indeed the soil itself. Freeze-thaw creates further challenges to root stability and leaves subtle traces of its action in patterned ground.

So when we cross a mossy stony plateau – such as that of Elidir Fach, for example - is it on tundra that we tread?

Mosses and lichens are in evidence, along with an abundance of clubmosses in places. Dwarf shrubs are there – crowberry, bilberry, and heather. All

JB Ratcliffe

Healthy heath: dwarf willow, bilberry and *Racomitrium* on Elidir Fach

these species have a broad distribution through submontane heath and grassland zones. But here too is dwarf willow *Salix herbacea*. It carpets the ground with neat round leaves like those of bilberry, but more substantial and patterned with a delicate net of veins. This is a true arctic-alpine tundra 'tree' which stands a full 2cm tall when its catkins are fully expanded. Such diminutive tree species are fully equipped for surviving late snow-lie or extreme exposure.

A talisman of wild tundra

The islands of dwarf willow on the Glyderau and Carneddau finally made sense for me when I stood on mountain tundra 300 miles north of the Arctic Circle in Norway. Early July, and at my feet there were the crowberry, bilberry, and heather, and there was *Salix herbacea*, prostrate amongst a selection of micro-willows and nano-birches. Some were with catkins, others still leafless, their winter buds freshly released from a snow mantle, poised ready for the month that is summer.

Back in Snowdonia, tens of thousands of people must tread on the dwarf willow's wiry branches as they seek the summits. Few notice it underfoot. Fewer still will recognise it as the talisman of truly wild tundra that it surely is; where dwarf willow grows, something special is afoot. This is underlined for me by its association with species which belong, seemingly, worlds away.

Each time I have encountered the miraculous dotterel in Snowdonia it has been on dwarf willow turf, whether on the bleak Carneddau stone-fields, on Elidir, Y Garn, or Y Gribin. Dotterel has a place, just, on Snowdonia's breeding bird list, and it is indisputably a high-arctic tundra specialist. The arctic-alpine moth *Catoptria furcatellus* has been seen a handful of times in Wales over 120 years. Mine were on Elidir Fach, the others high on Snowdon and Carnedd Llewelyn. A gall-inducing sawfly *Pontania herbacea* uses dwarf willow as its only host, resulting in a crop of shiny red 'berries'.

Dwarf willow is an overlooked but charismatic species, a long-lived plant with stories to tell. Large patches may represent ancient individuals. Its form of growth obscures where one genetic individual begins or ends. Growing in utter isolation, one can only wonder what genetic analysis would reveal about our Welsh populations and their relationships with others. An elegant piece of ecological research has demonstrated restricted gene flow at a micro-scale, between *Salix herbacea* plants growing in late snow melt patches and nearby plants on windswept ridges, mediated through different phenological responses which affect pollen transfer[2].

Forest of fungi

An unexpected phenomenon in this dwarf willow tundra is the suite of mycorrhizal fungi growing in symbiosis with the tiny trees. Here on a mountain top are familiar woodland fungi such as fly agaric, penny bun and amethyst deceiver; species which can hook up with a range of different trees. Alongside them are obligate dwarf willow partners – true

AN Graham

Specialised sawfly: *Pontania herbaceae* galls on dwarf willow. Elidir Fach

T Harrison

One nibble and you're nobbled: overgrazed *Racomitrium* heath on Pen yr Ole Wen

alpine species such as mountain grisette *Amanita nivalis* and pasture brittlegill *Russula pascua*, whose only Welsh sites are on Snowdonia's summits. This is a unique ecosystem far away from the nearest conventional woodland. It is an astonishing upside-down tundra 'forest' where we see fungi towering above their Lilliputian tree partners.

Dwarf willow is far from the only element of this summit vegetation to have good credentials as a tundra plant. Stiff sedge *Carex bigelowii* grows in the same habitats, whilst a range of specialist montane lichens and mosses are important. Of these, *Racomitrium lanuginosum* – woolly fringe-moss – is the most likely to be recognised, forming soft pillowy cushions amongst the stones on summits and scree slopes.

The comment is sometimes made that Snowdonia's montane heath is inferior to that found in Cairngorm or in the high Arctic. Ask why we lack so many attractive species found elsewhere and the answer will come in chorus: 'Sheep! - too many sheep!'

But we should look before we leap, mountain goat-like, to conclusions. It is true that our summits have no trailing azalea or dwarf cornel to brighten the fractured stone-field as elsewhere. But this may be an accident of geographical history, linked with differing patterns of plant radiation at critical points in the last glaciation and thaw cycle. As for moss campion, roseroot, and mountain avens, their affinity with inaccessible crannies and ledges in Snowdonia is in part an accident of geology, reflecting the distribution of the base-rich rocks which they favour.

A focus on mosses and lichens may give a different view, with new discoveries being made in healthy

CE Aron

Fungi on high: mountain grisette *Amanita nivalis* on Elidir Fach

proportion to recording effort. There is amongst the lower plants a significant suite of truly montane species, still making a living here thousands of years after the ice-tide turned and left them high and dry.

We should focus on the remarkable habitats and species we have, rather than look for species which, perhaps, never existed in this unique wet and windy outlier far from the Alps and the Arctic.

Threats

This does not mean that our tundra is not in need of help. In places there are too many sheep. In other places, too many walkers. Or rather, walkers using too many variants of a path. Great fans of erosion tens of metres across occur where the braid of the path has unravelled into dozens of threads. On Y Garn for example, this has happened right on the ridge where the dwarf willow tries to cling with its old roots to the loose and crumbling gravelly earth.

The challenges facing our montane heath have deep roots. Existing as little islets within the vast sea of upland farmland, our tundra is at the mercy of agricultural policies designed for more productive land on lower ground. Common land continues to be a battleground – between rights owners, between graziers and conservation bodies, and between those conservation bodies and a Welsh Government which has yet to grasp the nettle of commons issues on the Carneddau.

A very different threat comes with the beguiling label of 'rewilding'. A fresh approach to enabling ecological processes in the uplands is welcome. However, rewilding is already mired in the fetishising of lynxes and wolves, diverting interest away from organisms with less fur and fewer teeth, such as the quietly brilliant dwarf willow. A belief that 'nature will find a way' is fine if the desired outcomes are loosely

AN Graham

Micro-moth on a micro-tree: *Epinotia mercuriana* on dwarf willow. The moth's larval foodplants are heather and bilberry.

defined, but 'old-fashioned' nature conservation is needed to protect things of great fragility and great value. Here in Snowdonia, today, our Welsh tundra needs careful relaxing of grazing pressure for a limited period: rewilding approaches may not offer the required flexibility and management control.

Atmospheric deposition of nitrogen and sulphur add to the challenges and, together with climatic change may, or may not, overwhelm this fragile habitat with thickening grassier swards. Under these circumstances it would be easy to give up on our Welsh tundra.

We must not give up.

Outdoor activities bodies now build ecological awareness and responsibility into their training. Footpath splay, erosion, and over-zealous cairn building are solvable or at least manageable. Snowdonia Society volunteers and National Park wardens have begun careful cairn and path management and we know from the Lake District and Scotland that this work can enable recovery of fragile montane heath. The National Trust are using upland shepherding at Hafod y Llan to improve summit habitat condition which a simple reduction of sheep numbers has failed to deliver. With will and resources this work can be done.

Natural Resources Wales lead the Montane Heath Working Group and negotiate management agreements with farmers and graziers, and continue to seek the necessary help from Welsh Government. Importantly, staff from the key conservation bodies have not given up, though it must be tempting. They continue to add to our knowledge and seek the long term management and monitoring solutions which are desperately needed.

Something like tundra is utterly unexpected in Wales. It is worth the effort of trying to see it for what it is, a uniquely Welsh expression of montane habitats. The tundra in Wales is where arctic and alpine species live absolutely on the edge. These tiny areas of land have vast potential to educate and inspire.

***John Harold** is Director of Cymdeithas Eryri/The Snowdonia Society, a small but dynamic conservation charity. He has previously worked as a biodiversity officer, ecologist, land manager, estate worker, and gardener.*

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Twndra'r Mynyddoedd

Twndra yw'r tir uwch llinell y coed ac islaw'r llinell eira barhaol. Er nad oes gan Gymru linell eira barhaol mae'r planhigion sy'n tyfu yma yn rhai nodweddiadol o dwndra ledled y byd, wedi'u creu gan amodau eithafol. Mwsoglau a chennau a chorlwyni, er enghraifft helyg bach Salix herbacea, sy'n 2cm o daldra yn unig, sy'n tyfu yno'n bennaf. Mae ffyngau mycorhisol yn tyfu mewn symbiosis, ac yn llawer talach na'r coed bychain.

Mae twndra mewn perygl o ganlyniad i orbori gan ddefaid ac erydiad wrth i ormod o gerddwyr grwydro oddi ar y llwybrau. Bwriadwyd polisïau amaethyddol ar gyfer tir is mwy cynhyrchiol, ac yn aml nid yw porwyr, cyrff cadwraethol a'r llywodraeth yn cytuno ar y ffordd orau o'i reoli. Efallai nad yw'r dull 'ail-wylltio' yn caniatáu digon o hyblygrwydd i'r twndra oroesi.

Tammy Stretton

The pearl-bordered fritillary in Wales

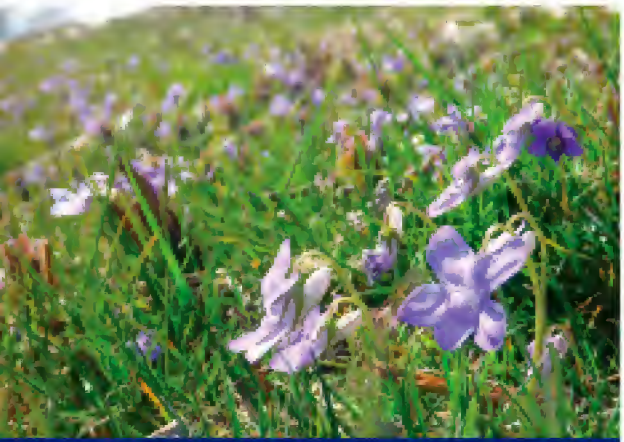
Pearl-bordered fritillary *Boloria euphosyne* Brithog berlog

The pearl-bordered fritillary is a rare, declining butterfly. Although it remains on a knife-edge in Wales, it is responding well to conservation action, as TAMMY STRETTON and RUSSEL HOBSON explain.

Woodland coppicing has a long history, having been traced as far back as Neolithic times. Along the way many species have evolved to take advantage of the different habitats which form as a result of this work. The fritillary butterflies are one such group, avoiding competition with one another by favouring slightly different post-coppice growth stages. For the pearl-bordered fritillary, the warm ground and flush of young violets which develop a year or two after coppicing is the habitat of choice. In much of England it remains faithful to these sunny woodland clearings, but in Wales and the south-west it seems to prefer ffridd, particularly areas of south-facing, scrubby slopes with bracken.

What is a PBF?

Six species of fritillary occur in Wales and the caterpillars of five feed on violets. The conservation of these five species was reviewed 12 years ago in *Natur Cymru*[1]. The article was mainly concerned with the pearl-bordered and high brown as they are the most threatened in Wales.



Montgomery WT

Good growth of common dog-violet (*Viola riviniana* Gwiolydd Gyffredin) & ground ivy (*Glechoma hederacea* Eidral)

The pearl-bordered fritillary *Boloria euphrosyne*, PBF for short, is the earliest of the small fritillaries to appear in spring; adults are typically on the wing between late April and the end of May. During their short flight period they make use of every calm, warm, sunny day to mate and lay their eggs on common dog-violet *Viola riviniana* or, more rarely, marsh violet *Viola palustris*. The caterpillars feed on the violets from late June until September when they enter hibernation. In the first warm days the following spring, they re-emerge and resume feeding until sometime in April when they pupate. Exactly when the butterfly emerges depends very much on the quality of the spring weather!

From mid/late May onwards, the PBF is not the only small fritillary patrolling these sunny hillsides. Its close relative the small pearl-bordered fritillary *Boloria selene* (or SPBF) is tricky to differentiate, in terms of behaviour and appearance. A less choosy butterfly, it occurs in many other violet-rich habitats, such as open moorland, damp grassland, coastal cliffs and dunes, as well as woodland and scrub. Although still an uncommon species, it is much more widespread than the PBF.

Separating these two similar species on the wing is not possible; a good look at the underwing is the most reliable method, which can be easier said than done on a warm, sunny day! The underside of the SPBF is brighter, with more silvery 'pearls', surrounded by black lines. On the PBF, there is much less black-lining and the 'pearls' on the edge of the wing are typically outlined in orange-red.

Challenging times

Changes in land management leading to habitat loss and fragmentation have turned this once common butterfly into one of our most rapidly declining species. Ffridd is vulnerable both to overgrazing by sheep and to the abandonment of grazing. Overgrazing can severely reduce the abundance of the larval food-plant and other spring flowers which are an essential source of nectar for the adults. Abandonment of grazing leads in a few years to an increase in the amount of bramble and scrub, with the consequence that the violets become shaded out.

From approximately 100 sites where it had been recorded post 1980, the PBF is now restricted to just twelve sites in Wales. This represents an 88% decline over a 20-year period and, given the gaps in the data record, is probably an underestimate. The last remaining stronghold in Wales is Montgomeryshire, where populations are thought to occur on nine sites. There are also two sites on the Ceredigion coast and one in Denbighshire.

Concern over the plight of the pearl-bordered fritillary in the early 1990s led to local surveys and a UK-wide survey of PBF sites between 1997 and 1999, initiated by Butterfly Conservation (BC) and funded by Countryside Council for Wales (CCW) and ICI[2]. They all made for depressing reading and clearly action was needed before it was too late.

In 2002, BC purchased Eyarth Rocks in Denbighshire and set to work managing the site through grazing and hard graft! Later the Ceredigion sites, which had been known for a long time, were brought into appropriate management by the National Trust.

Around the same time Dr Simon Spencer began working on PBFs with Montgomeryshire Wildlife Trust (MWT), with support from CCW. In 2002 just six sites were known in the county, only one of which was considered a strong population. A standardised monitoring protocol was set up to act as an early warning of any further deterioration in population

size or habitat condition; this monitoring is now in its 14th year. At the same time, surveys of good potential habitat identified a few new sites.

Whilst monitoring is vital, it alone will not save the species! Some sites were being lost almost as soon as they were discovered. It was clear that practical action was urgently needed.

Time for action

Considerable negotiations with land owners/managers and other interested parties in those early days have (in most cases) led to lasting good working relationships, with everyone doing their bit to help safeguard the PBF. Sustainable management, largely by getting the grazing right, has always been the ultimate aim, but due to the open, steep nature of many of these sites, this is a significant challenge. As a consequence, practical habitat management intervention is needed on a regular basis.

Habitat management works have been undertaken with the following aims:

- Encourage a good growth of violets for the caterpillars to feed on
- Ensure a plentiful supply of spring flowering plants to provide nectar for the butterflies
- Control bracken and scrub which, whilst needed to provide a warm micro-climate, must not become dominant, thereby shading out other plants. The most effective method uses a tractor-mounted flail to cut strips and patches in the scrub. Where the land is inaccessible to machinery, similar work is undertaken by hand.

Montgomery WT

Small pearl-bordered Fritillary *Boloria selene* Britheg berlog fach

MWT & BC volunteers have spent many hours bracken-raking! Whatever method is used, it is important to cover different areas in successive years, as the aim is scrub and bracken control, not eradication.

Of course, it is not just the PBF which benefits from this work; many other declining species spend at least some of the year in ffridd. As well as the SPBF, grizzled & dingy skipper, small heath, small copper, green hairstreak & wall butterflies are found on these sites. The habitat mosaics suit a wide range of birds too, including linnet, tree pipit, whitethroat and yellowhammer.

Reintroducing a butterfly

Llanymynech Rocks is a reserve of the Montgomeryshire and Shropshire Wildlife Trusts, straddling the Wales-England border. It is part of the Llanymynech & Llynclys Hills Site of Special Scientific Interest (SSSI) for which PBF is a qualifying feature. Great efforts were made to secure appropriate habitat management, but sadly they came too late, with no PBFs seen on the site after 2002.

Montgomery WT

Bracken growth is restricted to allow greater diversity

MWT Tammy Stretton

The upper wings of the pearl-bordered fritillary

A few years later the decision was taken to attempt a reintroduction of the species to the SSSI. Aside from the scarcity of the butterfly, the main driver for this was the location, which is part of a network of sites on either side of the border, as well as already being in conservation management.

PBFs were reared in captivity using stock taken from the strongest Welsh site, approximately 16km to the south of Llanymynech. A mixture of pupae and adults were then released at Llanymynech Rocks between 2009 and 2011. Happily this was a great success! Since 2013, this is the only site where both the habitat and adult numbers are considered as 'favourable' and PBFs have spread to other parts of the SSSI.

A positive future hangs in the balance

Despite the vagaries of the Welsh spring weather, our monitoring shows a positive long term trend for the PBF in Wales (see chart). This indicates just how successful the management of the remaining sites has been, especially when compared to the UK as a whole. The reintroduction project, too, was a successful driver to improve habitat management of border sites and, with the discovery of new sites in England, the future of this metapopulation is more secure. However, this trend is extremely fragile, as the condition of these sites will deteriorate rapidly if management is not sustained. We continue to seek sustainable habitat management solutions, but until we achieve this, the future of the PBF depends on regular practical management interventions, and funding is getting ever harder to find.

Acknowledgements

Our thanks to all the dedicated people who have contributed to saving the pearl-bordered fritillary in Wales over the last 15 years. The trend data was supplied by the UK Butterfly Monitoring Scheme run by Butterfly Conservation and Centre for Ecology and Hydrology.

__Tammy Stretton__ is Conservation Officer with Montgomeryshire Wildlife Trust and has been working with PBFs since 2008. __Russel Hobson__ is Head of Conservation with Butterfly Conservation Wales.

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Y fritheg berlog

Mae'r fritheg berlog yn hoffi llennyrch heulog mewn coetiroedd, sy'n digwydd yn aml ar ôl prysgoedio. Mae'n dodwy ei hwyau bron yn llwyr ar y fioled gyffredin. Mae'r lindys yn bwydo tan fis Medi, yna'n gaeafgysgu ac yn ymddangos yn eu llawn dwf yn gynnar y gwanwyn canlynol. Mae ei pherthynas agos, y fritheg berlog fach yn debyg o ran ymddygiad ac ymddangosiad, ond nid yw mor ffyslyd ynglŷn â'i chynefin ac, o ganlyniad, fe'i gwelir yn fwy eang.

Mae arolygon ers y 1990au wedi dangos bod colli cynefin wedi arwain at ostyngiad difrifol yn niferoedd y fritheg berlog a bellach dim ond mewn 12 safle yng Nghymru y gellir ei gweld. Roedd hi'n amlwg bod angen gweithredu ar frys. Mae proses o reoli cynefinoedd wedi ceisio annog y fioled ac wedi mynd i'r afael â gordyfiant o redyn a phrysg yn tyfu'n ddireolaeth. Yng Nghreigiau Llanymynech ar y gororau, llwyddwyd i ailgyflwyno chwilerod ac oedolion: dyma'r unig safle bellach lle y disgrifir yr amodau fel rhai 'ffafriol'.

All photos: FM Slater

The Llysdinam Legacy

Dedication: searching for early season newt eggs in the pond at Llysdinam

For 40 years Cardiff University's Llysdinam Field Centre was the hot spot of university research and teaching in very rural mid-Wales. For most of that period Dr FRED SLATER was the Centre's Director as amphibians, birds, otters, crayfish, new crops and the general environment came forward for study. Its legacy lives on in the expertise gained by the generations of students who came through its doors.

This is the story of the Llysdinam Field Centre at Newbridge-on-Wye in Powys and its contribution and legacy to the understanding of wildlife and environment of mid-Wales and further afield.

In the beginning

The Field Centre was administered from 1970 to 2010 by Cardiff University and its predecessor organisations, and to appreciate how the university came to have an outpost in rural mid-Wales deserves some explanation. The Centre was established at the invitation of the late Sir Michael Dillwyn Venables Llewellyn, owner of the Llysdinam Estate, who wished that such a facility should sit within land owned by the Llysdinam Charitable Trust. Sir Michael was then the custodian of his family's long interest in science and natural history. This ranged from the 19th century botanist and conchologist Lewis Weston Dillwyn FRS, through connections with names such as Faraday, Wheatstone and Fox Talbot, to his own father Sir Charles who, in 1911, set up on the estate one of the earliest nest box schemes for birds which has been maintained (with a

Radio-tracking willow warblers

few breaks) until the present day. Sir Michael helped to establish the Hereford & Radnor Nature Trust and continued his father's interest in the natural history of the estate, believing that the Field Centre would allow this legacy to continue.

Unglamorous on the outside

When I was about to be interviewed for the job of running the Llysdinam Field Centre in 1974, I approached Llysdinam along the road from Newbridge-on-Wye thinking how nice it would be to work in that magnificent house overlooking the Wye Valley! I soon discovered that the Centre would be in the old stable block and two prefabricated buildings suitably screened and distant from the house. As in so many aspects of life, it was clear we would be judged by who we were and what we did, and not by outward appearances.

Dabbling in the waters

In 1975, The Craig Goch Research Group (CGRG) took over new facilities at the Centre to study the potential ecological and environmental impacts of the proposed construction of the then largest reservoir in Western Europe in the Elan Valley. With an output of well over 50 reports and publications, partially summarized in book form in 1982[1], this was the most detailed study of any comparable river in Wales.

There followed a series of studies on habitat management and many aspects of freshwater life including algae, fish, invertebrates, amphibians and native crayfish, which have subsequently become valuable baselines from which to measure ecological change. A good example is the native white-clawed crayfish *Austropotamobius pallipes*, which was surveyed by students working with CGRG who found the species to be widespread in the Wye and Usk catchments. Elsewhere the crayfish had been introduced to waters around abbeys, monasteries and other religious foundations, and were regularly transferred from estate to estate[2]. Noting that in Wales they were found in streams adjoining such establishments, the question of how native they really are in this part of the world was investigated.

Nevertheless, whatever their origin, crayfish have always been an important element in the diet of otter *Lutra lutra* and other predators. The Centre's studies found that, from a state of relative abundance in the 1980s – where we found up to 98g of crayfish biomass per square metre in our most productive sites and two people could collect over 100 crayfish per hour without apparently denting the population – native crayfish now occur only in a few streams, destroyed elsewhere by fungal crayfish plague, siltation from agricultural and forestry practices, and sheep dip pollution. American signal crayfish *Pacifastacus leniusculus* have, on the contrary, prospered and have carried the crayfish plague wherever they occur. They have been widely introduced, changing stream ecosystems but providing an alternative food for otter and other predators. Our studies on crayfish have taken us far afield, to advise on introduced crayfish problems in the Azores and to examine native crayfish problems in North Island, New Zealand.

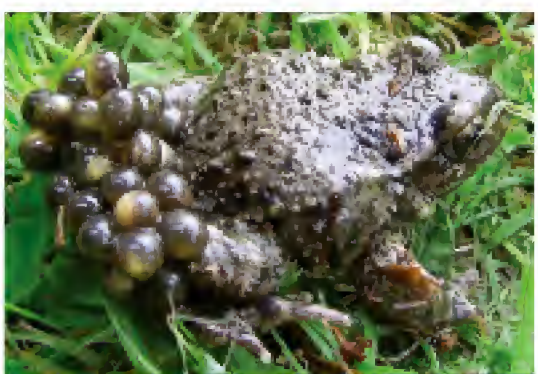
Road kill & ecology

Mention of otters in relation to crayfish highlights the Centre's long-term study of otter road casualties which began in the early 1970s and continues at Cardiff University as the Cardiff Otter Project. This work has documented the changes in the otter population, using mainly road casualty data. Pesticides were the main cause of the near extinction of otters in the 1970s, but the population has recovered so that almost all available watercourses have now been recolonised. Our otter project has not just quantified population recovery but has also given

the opportunity to identify otter road accident blackspots and to improve the design of road crossings used by otters. It has also monitored chemical pollution and provided data about otter biology, including genetics, fecundity, longevity, disease prevalence and parasite infestation, albeit on a biased sample of road deaths.

Another long-term aquatic study at the Centre has focused on amphibians, initially at Llandrindod Wells Lake and later at the Field Centre's pond, as well as further afield. In the mid 1970s, the Government's Manpower Services Scheme gave the Centre the funding to employ graduates on projects where they could improve their skills. We set up a study of wildlife road casualties, looking for links to factors including road type, road design and location. The Centre was then invited to help at Llandrindod Lake during the common toad *Bufo bufo* breeding season, when many toads were being killed on the lakeside road. We soon realized that very few studies had been undertaken on even the basics of toad ecology, and this was the starting point for three decades of work on amphibians.

We soon demonstrated that three times more males were present than females at the Lake, and that the males stayed for most of the breeding season. They often left the Lake nightly to sit chest-up on the road, waiting for females, and this led to their demise. By contrast, the females came straight to the Lake, spawned and left within a few days. Females were usually at least a year older than males when they first spawned and less than half of any year's spawning population would return again. Expanding our studies to all the local amphibian species we found, in relation to climate change, that over three decades there has been a movement towards earlier spawning in almost all species, and particularly in palmate newts *Lissotriton helveticus*.



Midwife toad *Alytes spp* not far from Llysdinam at Newbridge-on-Wye

Llysdinam

Terrestrial contributions

The legacy value in many of the Centre's studies has been their long term nature. We ran a moth trap nightly from 1975 to the end of 2014 as part of Rothamsted Insect Survey. As one of the longest running sites in this project we were able to see how the populations of moths and certain other species had changed over this period of time, in part reflecting agricultural change. We updated the long-term rainfall and max/min temperature recording started in the 1880s to a daily manually read agri-met station which the Met Office converted to an automatic station in 2010. Here we unofficially recorded minus 26ºC in 1981 (about as cold as it gets!) and minus 17.3ºC as the coldest November day on record on 26 November 2010.

An interest in peat and peatlands for filtration led to the Centre's pioneering work on the establishment of biomass energy crops, particularly short rotation willow coppice. There was also a successful attempt to encourage craft willow to be grown and made into baskets, or even coffins, and sold in Wales. We later brought *Miscanthus* (elephant grass), reed canary-grass, switch grass and prairie cord-grass into our biomass trials. Sustainable and renewable energy

Radnor Lily *Gagea bohemica* at Stanner Rocks, its only known UK location

Fred exploring the biomass grasses

resources are now watchwords for the next generation. Much of our later work investigated the value of these crops for wildlife and habitat enhancement. We were involved in developing natural vegetation biofilters, particularly using willow to treat farm waste and rubbish tip leachate, and we also looked at the disposal of digested sewage sludge to pre-existing woodland.

Influence and legacy

Sir Michael's role in the establishment of the Hereford & Radnor Nature Trust has already been mentioned. Several of the Manpower Services graduates at the Centre helped with the division of this Trust so that the Radnor Wildlife Trust could be established in 1987. Several of those involved went on to obtain influential posts in national and voluntary bodies.

The greatest legacies of any institution are its alumni, and the 'graduates' of the Llysdinam Field Centre, can be found in schools, universities, industries and organisations in the UK and throughout the world. Some have gone on to work as consultants, for governmental bodies, wildlife organizations or in academia, passing on their hard-won appreciation of the environment gleaned from the hills, valleys, rivers, streams and ponds of mid-Wales.

For several years in the early 2000s Radio 4 broadcast a quiz series called *Wildbrain of Britain* to find Britain's most knowledgeable naturalist. On one occasion, three of the four finalists and the eventual winner had Llysdinam connections – that must say something about the Centre, but I am not sure quite what!

Fred Slater *retired from Llysdinam Field Centre on its closure at the end of 2010 after 36 years as its Director. He still teaches at Cardiff University and for Lifelong Learning at Aberystwyth University, as well as being actively involved with the Royal Welsh Agricultural Society as an Assistant Honorary Director at the summer Show and Chair of its Spring Festival. His publications list can be found on the Cardiff University website www.cardiff.ac.uk*

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Canolfan Maes Llysdinam

Am 40 mlynedd, Canolfan Maes Llysdinam oedd un o brif ganolfannau ymchwil a dysgu'r brifysgol yn y Gorllewin gwledig. Mae llawer o'r gwaith ymchwil wedi darparu llinellau sylfaen gwerthfawr sydd wedi bod yn fodd inni fesur newid ecolegol, gan gynnwys: effaith ecolegol adeiladu cronfa ddŵr Cwm Elan; dosbarthiad y cimwch afon crafanc wen; magl gwyfynod yn y nos rhwng 1975 a 2014, a oedd yn dangos sut roedden nhw wedi newid dros amser; gwaith arloesol ar gnydau ynni biomas, fel adnoddau ynni adnewyddadwy ac fel cnydau gwerthfawr ar gyfer bywyd gwyllt; ecoleg llyffantod; cofnodion tywydd dyddiol; a dadansoddiad manwl o ddyfrgwn sy'n cael eu lladd ar y ffyrdd, ac yn cynnwys llygredd cemegol, mynychder clefydau a phwysigrwydd sut mae ffyrdd yn cael eu dylunio.

Mae gwaddol y Ganolfan yn parhau ymhlith y cenedlaethau o fyfyrwyr a fu'n gweithio yma; maen nhw bellach yn gweithio ym mhedwar ban byd mewn ysgolion, prifysgolion, diwydiannau a sefydliadau, gan rannu gydag eraill eu gwerthfawrogiad o'r amgylchedd a gafodd ei feithrin yn nhirwedd y Canolbarth.

Exposed Riverine Sediments – living on the edge

The edges of rivers and streams can provide unique and valuable habitats for many rare and highly specialised invertebrates. These habitats include earth cliffs, muddy drawdown zones (areas frequently exposed to the air due to changes in water level), seepages, woody debris, moss covered rocks and, in particular, plenty of Exposed Riverine Sediments (ERS).

The nature of ERS

Exposed Riverine Sediments are areas of relatively un-vegetated, fluvially deposited sediments (cobbles, pebbles, gravels, sands and silt) that are frequently inundated where they sit within the river channel. Their distribution and abundance are very variable, and largely dependent on flooding that removes vegetation and re-works the sediments to create new areas of ERS. Geology, flow, flood regimes, river modification/management and surrounding land use are also contributing factors. Generally there is a progressive reduction in the sediment size, from coarser boulders and cobbles in upland areas to fine shingles and sand further downstream. These habitats are therefore particularly sensitive to changes in the hydrological regime (the amount, timing and duration of high flow events) and sediment load. In natural, unmodified rivers the distribution of ERS is patchy but regular. However, in rivers that have been modified – for example, by straightening, sediment extraction or excessive trampling by cattle – ERS habitat is rare or of a poor quality.

In the UK there are 441 species of beetle, 57 spider, 42 fly, and seven species of bug known to inhabit ERS. Of these, 48% are found exclusively on ERS, or similar, non-riparian habitats such as drawdown zones around reservoirs, bare ground, gravel pits and disused quarries. Of the beetle species, 131 are considered specialists of ERS and 86 (66%) of these have Red List, Red Data Book or Nationally Scarce status. Seven are identified as Priority species in the UK: ground beetles *Bembidion testaceum* and *Bembidion quadripustulatum*; diving beetle *Bidessus minutissimus*; water beetle *Hydrochus nitidicollis*; the Southern silver stiletto fly *Cliorismia rustica*; and rove beetles *Meotica anglica* and *Thinobius newberyi*. These latter species, both tiny (less than 2mm) subterranean beetles, are through to be endemic to the UK.

Adaptations

ERS invertebrates have developed a range of behavioural and physiological strategies allowing them to survive unpredictable flood events. The ability to fly is high in riparian beetles, an essential trait for avoiding floods. Some species of ground beetle, eg *Bembidion spp*, have long legs and an elongate, flattened body enabling them to swim, skate on the water surface, or stay afloat. This body shape also allows rapid movement over the sediment surface and between stones. Ground beetle *Clivina collaris* and rove beetles (*Bledius spp*) have strong legs for deep burrowing.

Wolf spiders are robust, long-legged species capable of rapid movement. Some, eg *Pirata piraticus*, have hydrophobic hairs allowing them to run over the water surface. Others, such as Northern bear spider *Arctosa cinerea*, favour drier areas of coarse sediment where they can hide, moving to finer sediments to construct silken burrows.

The ERS resource in Wales, Scotland, and North and South-west England is a habitat of specific conservation concern in the UK due to the rare invertebrate fauna it supports. Some of Wales' finest ERS rivers include the Severn, Wye, Tywi, Ystwyth and Rheidol. One of the best places to see ERS at its finest is Llandinam Gravels, a Montgomeryshire Wildlife Trust nature reserve in Powys. This section of the River Severn is incredibly active, with floods regularly reworking and creating new patches of ERS.

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© Kevin McGee

Northern bear spider *Arctosa cinerea*, an ERS specialist found on several rivers including the Severn and Wye

Stuffed, Pickled & Pinned - wonders of nature in Welsh museums

We usually think of nature exploration as something that begins in the great outdoors. All too often it involves wellies and waterproofs here in Wales. That's not always the case though. A new Welsh museum exhibition, part of the Linking Natural Science Collections in Wales project, is revealing some weird and wonderful wildlife secrets – and you can find out more without getting wet.

A delicate watercolour by Ladybird book illustrator Charles Tunnicliffe, a seaweed 'book' created inside a scallop shell, and a fossil seashell found at the summit of Snowdon… **Stuffed, Pickled and Pinned: 50 Wonders of Nature in Welsh Museums** is the culmination of three years' work behind the scenes at 18 local museums across Wales to find rare, beautiful and often unexpected natural history objects, some of which have never been seen by the public before.

Our nation's regional museums are home to an astonishing array of wildlife. Did you know, for instance, that a visit to Cyfartha Castle in Merthyr Tydfil will reveal an emperor penguin from Shackleton's Antarctic expeditions? Or that Abergavenny Castle and Museum is the proud possessor of a holy rhubarb leaf? For nature at its strangest, Llanidloes Museum have a two headed lamb on display and Ceredigion Museum's store is home to a two headed calf. If you prefer a tiny collection of seaweed pressed into the pages of a book inside a scallop shell, Carmarthen Museum has an exquisite example tucked away in the stores. Perhaps British butterflies and moths light your candle. If so, Chepstow Museum has drawers and drawers of them tucked inside a wooden cabinet waiting to be opened by curious members of the public.

These gems and many more are housed in museums all across the nation. Some are on display but many were hidden from view until Linking Collections brought them out into the light. The project has brought together natural science specialists from National Museum Wales and curators, educators and volunteers from 18 partner museums. Together they are lifting the lid, sometimes literally, on a magical world of natural wonders.

Often the collections in our museums are the work of Victorian and early 20th century enthusiasts who travelled far and wide to amass geology, botany, egg or insect collections. Sometimes they reflect that era's passion for killing, stuffing and displaying local, or exotic, fauna: Scolton Manor in Pembrokeshire has a somewhat unnerving collection of ten mounted fox's heads in its grand entrance hall. Some snarl, some just stare, but none look overly friendly. Brecknock Museum's costume collection includes a stole made of badger fur, and the museum is also home to a beloved family dog, immortalised in taxidermy.

Other collections reflect the industrial past of the museum's locality. Oriel Ynys Môn includes slate and exotic building stone quarried locally, as well as a beautiful geological map of Anglesey, while Wrexham houses samples of coal and lead ores uncovered during commercial extraction. Swansea Museum is home to some beautiful plant fossils associated with the South Wales coal measures. The Colorado beetle at Tenby Museum is part of a bigger story too. It can devastate potato crops, and historic examples such as this one still help scientists to develop ways to tackle the problem.

Some museums have collections with an educational focus. Newport Museum has teaching specimens that date back to the 1950s, including a rabbit which, when viewed from one side appears to be a traditional taxidermy specimen. Turn it around, however, and its skeleton is revealed. Others show the skill of the scientific illustrators who meticulously recorded the beauty and individuality of the natural world. Tenby Museum houses a beautiful book packed

All photos: AC-NMW

The hidden workings of the rabbit

A mini seaweed herbarium hidden inside a King scallop shell

with drawings of moths, some with associated specimens. Some objects have found their way into museum collections simply by virtue of their strangeness. A mummified cat and mouse discovered in a local barn, for instance, are now on display in Rhayader Museum.

Herbarium specimens support taxonomy

Fossil fern from Coal

Linking Natural Collections has a big agenda. It is part of a series of projects which view all the collections housed in museums, archives and libraries across Wales as part of our collective heritage. Now that the museum material has all been reviewed, an online catalogue on People's Collection Wales is being created that can already be explored by the public. Learning materials will allow museums to share these wonderful objects with school children, families and interested adults.

Linking Collections

18 Welsh local museums have been involved in the project, which is led by the Federation of Museums and Art Galleries of Wales in partnership with Amgueddfa Cymru - National Museum Wales. It received £100,000 in funding from the Museums Association's Esmée Fairbairn Collections Fund. Partners also include People's Collection Wales, who will make the exhibition available online, the Welsh Government's Museums, Archives and Libraries Division and Cardiff University.

Museums across Wales are home to some breathtakingly beautiful objects that illustrate the diversity of life in this tiny nation and beyond. These collections can shed light on how that life has evolved, how it is still changing in the modern world and even how our actions might affect it in the future.

An exhibition of the Linking Collections project will be touring 14 museums around the country until 2018, starting with Welshpool until December 2015 and followed by Abergavenny from January to April 2016 (see back cover).

Not all of the material described is on display. Please contact individual museums for more information on the Welsh Museums Federation website **http://welshmuseumsfederation.org**

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Pollen analysis: the Regency Restoration project at the National Botanic Garden for Wales

In the last 12 months a massive amount of work has been done at the Garden in order to understand the impressive feats of water management that created the necklace of lakes surrounding the late 18th century Palladian mansion on the Middleton Hall Estate. In recent years the Garden has worked closely with Swansea, Aberystwyth and Trinity St David's Universities as an industrial partner in the Access to Masters Programme, providing a wealth of invaluable information and scientific understanding about the natural history of the Garden.

With kind permission of the Grant family

Paradise regained

In previous years students have: analysed the accumulated sediment that forms the bed of the long since emptied Llyn Mawr; identified veteran specimen trees that formed part of the Regency era plantings; modelled water flows through the valley, based on historic rainfall records and rainfall watersheds; looked at monitoring climate change through carbon capture in tree growth.

In 2015 one of the last cohort of Access to Masters students was Swansea postgraduate Matthew Watkins. He sought a fuller understanding of the botanical and horticultural character of the estate during its heyday in the late 18th /early 19th centuries by attempting a palaeoecological reconstruction of the landscape through the retrieval and analysis of soil-embedded pollens.

His findings, it was hoped, would also allow a scientific comparison of evidence from the ground with the impressive pictorial record of the estate created by renowned surveyor Thomas Hornor, in 1815. His series of 14 watercolour depictions were created when Middleton's owner, Sir William Paxton, was effectively satisfied that his chef d'oeuvre was complete and his designed landscape now worthy of official record.

Pollen revelation

Matthew's findings bore out much of what could be seen in the paintings; that the tall stands of spruce and pine were contemporary with deciduous planted woodland, that hornbeam was an introduced component, and that Hornor very probably had 'painted what he saw on the tin'! What Matthew also discovered was, however, something that we weren't prepared for. Within the pollen assemblages were significant quantities of *Eucalyptus* grains. Surely some mistake, he thought, so samples were checked, re-checked and confirmed. There was no doubt.

That Sir William Paxton was one of the wealthiest men in Britain at the end of the 18th century was well known; that he had commissioned some of the finest creative minds of his generation to create his designed landscape was never in doubt; that he was interested in gardening could be guessed at – he had two garden houses in Bengal. What was not known, however, was that he had such a keen eye for the innovative and unusual plantings that were being experimented with at that time. It is Sir Joseph Banks who is credited with introducing *Eucalyptus*, *Acacia* and, of course, *Banksia* to Britain no earlier than around 1774. Paxton was remodelling Middleton estate from the late 1780s onwards, and Matthew's magnificent discovery makes this example of *Eucalyptus* one of the earliest in the UK.

In the hope of eliciting some vague interest, I mentioned this to my 12 year old daughter, Hannah. "Ooh," she purred, "Does that mean he had koalas, too?"

We're still looking for those!

***Rob Thomas** is Head of Development at the National Botanic Garden Wales, and Project Lead for the Regency Restoration.*

Green **Bookshelf**

Inglorious: conflict in the uplands
Mark Avery
Bloomsbury
2015
304 pages
Hardback
£16.99

Many people with an interest in wildlife, and particularly birds, will have heard of the books *Fighting for Birds* and *A Message from Martha* by the same author. Any person who follows Mark Avery's Twitter account (@MarkAvery) will know that he is a person who campaigns. He brings issues to the notice of his followers and he invites and encourages them to show support for these issues.

Inglorious is about driven grouse shooting. More particularly, it is a plea for driven grouse shooting to be banned. That may seem extreme but Mark presents arguments that have been put both in support of driven grouse shooting and against it. As he is a scientist he gives a large amount of evidence for both cases and then makes some value judgements which indicate very clearly why he comes down on the side of banning the activity.

Such a presentation sounds as if it could be dreadfully dry and boring. However, that is not the case. Mark puts forward his evidence and arguments in a very engaging way that draws in the reader such that it can be difficult to put the book down. As someone who has had the pleasure of ringing nestling hen harriers in Wales, I am slightly biased.

Supporters of driven grouse shooting tend to be wealthy landowners who claim that they are doing wonderful things for conservation, especially for their target species, red grouse. It seems that their support for conservation includes: illegal killing of hen harriers, legal killing of a range of mammals that share the hills with red grouse, burning of heather moors, and burning peat bogs to increase the amount of heather cover on the hills. The landowners who do all these things receive some of our taxes as agricultural subsidies, never mind the subsidised licensing of gun ownership, so all of us are supporting driven grouse shooting.

Mark presents evidence that this regime does not, in the main, help conservation of either uplands or grouse. The burning of moors and bogs mean that they no longer hold the water that they used to and this means it runs off the moors quickly and carries material with it, causing flooding and pollution downstream. Red grouse are raised and protected, living at unnatural densities so that they may be shot out of the sky as part of a very expensive 'sport'. The ecology of uplands is drastically altered and mammals like red foxes, weasels and even mountain hares are killed. Worst of all, despite the Protection of Birds Act 1954 and subsequent conservation laws, the illegal killing of hen harriers has continued for over 60 years with very few people ever being prosecuted.

The book is very persuasive and the ultimate message is simple – ban driven grouse shooting! Read it and see if you agree.

Ian M Spence

Coastlines – the story of our shore
Patrick Barkham
Granta 2015
368 pages
Hardback £20

Initially I struggled with this book. After a long introduction and first chapter, I was still waiting for the story of our shores to begin. After mentally renaming it "the musings of a coastal rambler", I was able to start enjoying it.

It is actually a collection of stories; some personal, some historical, some that don't quite fit any category. The two things that link them are the coast and the National Trust – hence it covers only England, Wales, and Northern Ireland, as does the Trust (ie not the National Trust for Scotland). And then it is further restricted to properties acquired under Enterprise Neptune. The Trust itself stays in the background, mentioned only in passing.

It's not a book that can be read in a hurry – the often poetic prose requires a relaxed mind to appreciate and absorb. It's not a book with a straight narrative – the author takes us to and fro, across and up and down the country. It mingles history (the country's and the author's) with art (Plas Newydd), literature (Daphne du Maurier), economics (coastal defences), engineering (nuclear and renewable power), education (Stackpole Centre for Outdoor Learning), and much more.

It is a book about our relationship with the coast and, as such, the chapters are arranged to follow the course of life – childhood, passion (love), war, work – finishing with the

shores of the future. In this final chapter the tone changes from mostly poetic to mostly passionate as the author discusses the ambiguity within the relationship – "It frightens us and reassures us, it sedates and awakens us".

If, as I was, you are expecting an account of the shore, how the dunes and cliffs were formed and how it all works, you will be disappointed. This is why I struggled with it at first. Think more along the lines of the TV series "Coast". On a practical note, each chapter finishes with a brief description of how to visit the places mentioned.

So, now you are prepared, sit back and enjoy the read.

Annie Haycock

A William Condry Reader
Jim Perrin
Gomer Press
221 pages
Hardback £14.99

William Condry died at the age of 80 in May 1998, and is widely regarded as one of the finest natural history writers of the 20th century. He will always be remembered, not least by those who had the privilege of knowing him and sharing his company, as I did. One of his many admirers is Jim Perrin, who spent a good deal of time with him and regarded him as a wonderful mentor.

Dedicated to William's widow, Penny, who still lives by the Dyfi estuary, and as a tribute to the great man, Jim Perrin has produced this fascinating and illuminating book containing his selection of some of Condry's best published work. There is a short foreword by Gwyneth Lewis, writer, composer and former national poet of Wales. This is followed by a substantial introduction by the author, in which he tells us a lot about Condry's background, his modest and unassuming nature and his brilliance as a field naturalist and writer. Perrin also recalls with great fondness their various field excursions together. This chapter is very illuminating and helps the reader to appreciate Perrin's varied choice of Condry's writings.

The selection of works takes the form of seven separate parts or chapters, each covering a particular theme. The first is 'Exploring Westwards', followed by 'Seven Early Nature Essays', 'Friends and Mentors', 'The Naturalist Afield', 'Further Afield', 'Reflections on Nature Conservation' and finally 'Envoi' (a brief recollection of a walk up a remote valley overlooking the Dyfi estuary). These works are a wonderful illustration of how Condry was able to impart profound knowledge and views in such a simple and absorbing style of writing. The chapter about nature conservation is particularly interesting, providing an insight into Condry's practical knowledge of the subject and his ethical and deep commitment to the cause.

Finally the book contains a useful select bibliography and a reminder that each October Condry's life continues to be celebrated through the Annual William Condry Memorial Lecture held at Y Tabernacl in Machynlleth.

Chris Fuller

A Natural History of Lighthouses
John A. Love
Whittles Publishing
293 pages
Hardback £30.00

Despite the title, almost two thirds of this book, packed with fine colour photographs, provides an epic history of British and Irish lighthouses. The author has a long experience of the wilder northern coasts; he was Area Officer for Uist, Barra and St Kilda, and subsequently Manager of the Sea Eagle Introduction Project.

Lighthouse keepers in the late 19th century were encouraged to send in observations of birds seen, making an early contribution to the scanty knowledge available at the time concerning bird migration. As a result, naturalists themselves began to visit lighthouse headlands and small islands - pioneers like W. Eagle Clarke and the Duchess of Bedford in Scotland, and Richard Barrington in Ireland.

Both Murray Mathew in *The Birds of Pembrokeshire and Its Islands* (1894) and R.M. Lockley in *The Birds of Pembrokeshire* (1949) refer to the occurrence of migrating birds at lighthouses. Sadly no detailed observations from those early years seem to have survived. However, the *Skokholm Bird Report* (1960) provides a glimpse as it includes a summary of migration that year at The Smalls lighthouse. The keepers recorded almost 50 different species of land birds, including kestrel, water rail, cuckoo, wren, robin, chiffchaff, goldcrest and snow bunting, though blue tits and

great tits were surprisingly absent.

The problems of bird strikes in certain weather conditions at the Bardsey lighthouse have been well documented, and are summarised here. Some 89 species have been involved. One of the most extraordinary occurrences took place on 9/10th November 2002 when 31,573 birds of 18 species were recorded, fortunately with only 249 fatalities.

Sadly a major source of information about birds at lighthouses seems to have escaped the author's attention. I refer to *A Lighthouse Notebook* by Norman McCanch, illustrated by the author and published in 1985. His career embraced five lighthouses, his longest service being on the South Bishop to the west of Ramsey.

Finally, the absence of a bibliography and an index is most regrettable. I would much rather have admired fewer photographs, however good, to ensure room for these essential sections.

David Saunders

The Moth Snowstorm – Nature & Joy
Michael McCarthy
John Murray 2015
262 pages
Hardback £20

Anyone who values nature will understand at once the essence of what this book is about: that sense, which can hit you from nowhere, of profound connection to the natural world, which the author calls 'joy'. The 'moth snowstorm' of the title refers to a phenomenon probably never experienced by anyone under 30 in this country: summer nights when moths were in such abundance that they appeared in car headlights like a snowstorm. The book is at the same time a lament for what is lost, a hymn to what is, and a call to arms to stand up for what is left. The writing moves effortlessly from the deeply personal to the globally significant, examining such diverse issues as the impact of nature on children, the missing sparrows of London, a paucity of songs about estuaries, mad March hares, the modern, disillusioned abandonment of the praise of beauty, the glories of colour, and the failure to reintroduce salmon into the Thames.

The most shocking story, for me, lies in the tidal bay, some 600 miles long by 400 miles wide, where China's Yellow River disgorges into the Yellow Sea. The mudflats here are amongst the richest in the world, home to countless native species and a major stopping off point for some 50 million birds on their annual migration. Nearly a tenth of the world's human population lives in river catchments which drain into the Yellow River and, quite apart from the sewage and pollution, pressure is on to reclaim land from the bay. That process has already begun, piecemeal, and bird numbers are already falling.

The book goes on to discuss the finer distinctions of 'joy', 'peace' and 'wonder', but all are facets of the same experience. Without being dogmatic or militant, Michael calls, not so much for 'action', as for a willingness to be counted, and to speak a truth which is not spoken enough: that nature is worth saving simply for itself and not for any financial tag that may be placed upon it. With pressures on the natural world increasing as the human population continues to rise, the current world estimate of 7 billion people means "… the essence of the trouble to come is their individual choices multiplied 7 billion times."

Mandy Marsh

Natura 2000 - the natural wealth of Wales

A report out in November 2015 puts a price, for the first time, on the cost of restoring the very best of Wales' wildlife. A project run by Natural Resources Wales (NRW) and supported by the EU LIFE scheme has calculated that £120 million is needed by 2020 to tackle the challenges on Wales' 112 Natura 2000 sites and to make significant progress towards bringing the 123 different protected habitats and species into favourable condition.

It may seem like a substantial sum, but the Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) which make up the Natura 2000 series account for around 7% of the land area of Wales and nearly 36% of Welsh seas. Any investment is returned many times over as these places deliver benefits such as recreation, tourism, carbon sequestration, flood defence and pollution control.

The results were drawn from the work of the LIFE Natura 2000 Programme, which has prepared Prioritised Improvement Plans (PIPs) for each site and identified 3,600 actions. Each PIP was produced by NRW Conservation Officers, with valuable input from partners involved with site management.

The PIP for Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC near Wrexham gives a good example of the type of priority actions required; management agreements with landowners, direct management on the National Nature Reserve, and the preparation of a Site Nitrogen Action Plan. Work includes tree and scrub removal, blocking drains to retain water on-site, removal of solid waste, and improving ditch management. Vital funding for this work is now being sought in an EU LIFE submission, led by Natural England, which the PIP has helped to inform.

Eleven key challenges affect Natura 2000 sites across Wales, including: invasive species; inappropriate grazing; air pollution; diffuse water pollution; changes to water conditions; climate change; and habitat fragmentation. Thematic Action Plans have been prepared for each of these, looking at strategic measures such as changes to policy and legislation which could help resolve issues which cannot be tackled at a local level.

The plans can be used to guide delivery on the ground by NRW and other organisations. They can also be used as a springboard for making European and other grant bids, and integrating Natura 2000 needs into other sectors such as flood defence, forestry, or tourism to maximise mutual benefits from limited funds.

Making the best of it

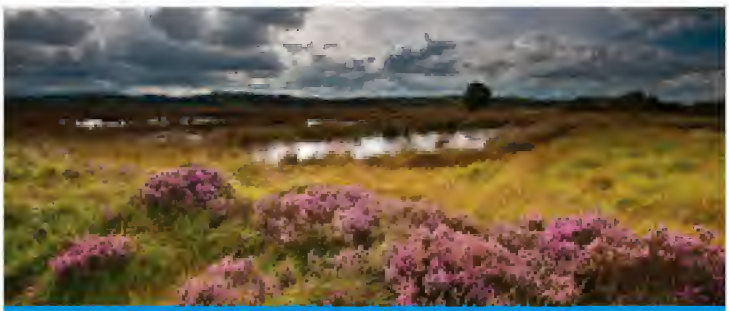
When resources are limited they must be carefully targeted, and actions on specific sites have been prioritised according to where the need is greatest. A Wales-level analysis has identified certain priority ecosystems, particularly where designated species and habitats are in poor condition. These include peatlands, sand dunes, woodland, rivers, estuaries, saltmarsh, lagoons and shingle.

The wealth of wildlife supported by Natura 2000 is showcased in 11 short films in English and Welsh, narrated by broadcaster Dei Tomos. These films communicate the importance of Natura 2000 protected sites, not only to wildlife, but also to people and the economy.

Kathryn Hewitt, *LIFE Natura 2000 Programme Manager*

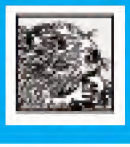
Further reading

The *LIFE Natura 2000 Programme for Wales: Summary Report* (Natural Resources Wales, Cardiff, 2015), together with PIPs, Thematic Action Plans and other outputs of the LIFE Natura 2000 Programme, including the short films, are available on the LIFE Natura 2000 web pages at www.naturalresources.wales/LIFEN2K Further information can be found on facebook, twitter and Youtube.



CNC-NRW

Cors Caron Special Area of Conservation



Mammals round-up

Making a come-back

Since the early 1900s predator control associated with game shooting, coupled with the loss of significant mature woodland, has left pine martens clinging on in north-west Scotland and tiny pockets of the uplands of northern England and Wales. An exciting new project led by Vincent Wildlife Trust sees 20 native pine martens from Scotland beginning a new life in the woodlands of mid-Wales, with plans for a further 20 animals arriving next autumn.

Amy Green of North Wales Wildlife Trust will be promoting 'Hedgehog Street' to communities in the Alun & Chwiler Living Landscape area, with the aim of improving connectivity between gardens, allowing wildlife of all kinds to make full use of their surroundings. Ben Stammers notes more frequent sightings (and corpses) of hedgehogs than in recent years, and Nigel Brown recently enjoyed a hedgehog visiting his Anglesey patio.

Emily Meilleur found water shrew droppings on Cors Geirch, while Geoff Gibbs picked up a freshly dead water shrew in Llanfairfechan village in September. More evidence of these elusive animals would be interesting.

Water voles

The Wildlife Trust of South and West Wales, with Natural Resources Wales, is continuing to monitor water voles and identify new sites in the northern Tywi Forest. They have also reintroduced them to a second part of their Ffrwd Farm Mire nature reserve in Carmarthenshire. Further north, Amy Green is leading water vole surveys of the Alun & Chwiler area. She will be running a training course next year and volunteer help is welcome! She is also coordinating an effort to keep the area safe for water vole by training people in mink monitoring and control and providing mink rafts and traps. There has been recent confirmation of water vole on the Afon Wygyr/Meddanen in Llanfechell, Anglesey.

Red squirrels

'Red Squirrels United' is a new UK-wide partnership involving the Welsh Wildlife Trusts and Red Squirrels Trust Wales. The work programme will control grey squirrels in key areas including Mid Wales, Clocaenog forest, Anglesey and northern Gwynedd, with the aim of safeguarding red squirrel populations across natural and plantation woodlands. Funding is from the EU Life+ scheme and HLF UK. Residents of Anglesey and the Bangor area are increasingly enjoying red squirrel acrobatics in their gardens, and records from nature reserves in the area continue, with repeated sightings at Coed Porthamel.

Marine life

This autumn has seen over 50 Risso's dolphins around north-east Anglesey, a record number. Risso's are site-faithful, returning year after year to the same area. They feed on squid, octopus and cuttlefish, and there may be a seasonal abundance attracting them. They also range widely; the same animals have been seen off Pembrokeshire, the Llŷn Peninsula, the Isle of Man, and even West Scotland. Risso's dolphins are uncommon in Britain, so it is a delight that they see west Wales as part of their home range. Further east on Anglesey there have been multiple sightings of a common seal amongst the grey seals on Puffin Island.

Beavers

There has been no authorised reintroduction of beavers to Wales yet, but there are reports of beavers living wild from unauthorised releases and/or escapes from private collections; they are certainly on the Dyfi, as there is evidence of beaver foraging and local fishermen regularly see them.

The Wildlife Trusts in Wales are progressing their plans to undertake a managed release of beavers to the Afon Rheidol. A managed release will allow the development of systems to help mitigate any potential negative impacts from the beavers, as well as increasing our understanding of their success. The Trusts are also engaged in a reintroduction proposal being developed by a private landholder in South Wales.

NWWT nature reserves in the north-east are hosting a new project connecting people with wildlife, and using camera traps to capture images of passing wildlife, including lovely footage of a rarely seen polecat at Coed y Felin. The i-Wild North Wales project is run by NatureSpy, a wildlife-focused Social Enterprise. Cameras are in place at Wildlife Trust Coed Cilygroeslwyd, Marford Quarry and Aberduna nature reserves.

***Frances Cattanach**, Director North Wales Wildlife Trust*

Proposed Tidal Lagoon in Swansea Bay

The proposed Tidal Lagoon in Swansea Bay (TLSB) would have the longest embankment or breakwater yet in Welsh waters, and would enclose the largest area of previously open sea. Considerable marine ecological effects would be inevitable and, as it might be the forerunner of several other power generation schemes, it is doubly important that changes be properly understood. This applies whether or not sites, species or habitats with conservation designations are impinged upon. Documentation on potential environmental effects already seems to run to many hundreds of pages and it is increasingly difficult for those not directly involved to pick out nuggets of real information from the jargon that now bedevils environmental bureaucracy.

The Cob, Porthmadog

Just over 200 years ago in 1808-1811 William Madocks built the Cob embankment across Traeth Mawr in the Glaslyn Estuary. Elizabeth Beazley's biography of William Madocks[1] gives a fascinating account of the practical and financial tribulations in the building of this 1600 yard long structure. Unlike at Swansea Bay, rock could be quarried at either end, but with just manpower and horses they still had considerable difficulty closing the final gap through which the tide rushed. Even then a storm surge tide broke through the embankment in 1812. The permanent ecological changes landward are obvious, but reduction of the tidal prism must have caused changes to the ecology to seaward that were not monitored, as might be expected were it being built today.

Holyhead Breakwater, Anglesey

A few decades later (1845-1873) an even bigger structure was built, this time in an open water situation more akin to Swansea Bay. Holyhead Breakwater, which is 1.48 miles long, again had the advantage of a nearby source of rock. Steam power was by then available for a wide-gauge railway to carry massive rocks. To this day storm waves breaking over the breakwater are a not infrequent sight. Less obvious, but of ecological interest, were the changes to the seabed. The reduction of swell waves and tidal currents favoured mud deposition where there must formerly have been tide-swept gravels and sand. Cores taken here a few years ago implied that this mud accumulated fast enough, and with enough organic matter in it, for anaerobic decay to result in methane gas being trapped. Brought on deck, parts of these cores resembled Aero chocolate.

A feature of the seabed in Holyhead Outer Harbour that would probably not have been predicted was the occurrence of a population of the sea pen *Virgularia mirabilis*. These relatives of sea anemones protrude from the mud supported by a rigid rachis, and when disturbed can withdraw below the sediment surface. In the Irish Sea they are more often found well offshore in deeper muddy sediments; the nearest others to Holyhead are in the basin west of the Isle of Man, so the initial recruitment to Holyhead was quite a leap. A more likely analogy with what may occur in parts of Swansea Bay happened at Holyhead when the berth alongside the Anglesey Aluminium jetty was dredged. The depression in the seabed was colonised by large numbers of a small worm that is characteristic of disturbed places where organic matter is inclined to settle. This is *Capitella capitata*, a prime example of an opportunist 'weed', though it may not be a single species but a range of cryptic ones differing mainly in the way they exploit disturbed situations.

Capitella capitata

© Hans Hillewaert. CC BY-SA 4.0

Given the scale and anticipated costs of the Swansea Bay Tidal Lagoon it is to be hoped that the promoters of it will not begrudge spending on ecological monitoring, beyond the minimum required to meet statutory obligations. Unexpected biological things are bound to happen that physical and chemical models cannot predict.

Ivor Rees

1. Beazley, E (1967). *Madocks and the Wonder of Wales, the life of W A Madocks, MP 1773-1828*, Faber & Faber.

Welsh seabird colonies – how are they faring?

Wales is home to one of the UK's best coastlines for seabirds, with the mix of isolated islands, steep cliffs and rich seas supporting vibrant colonies. This coastal wildlife spectacle is enjoyed by tens of thousands of visitors annually, boosting the Welsh economy through tourism. In 2006, a Welsh Government report estimated that spending associated with an overnight visit to the coast amounted to around £648million, nearly 40% of total tourism spending in Wales; around 5% of this revenue was attributable to the wildlife of Welsh seas, over £30 million per annum.

Colony change and food supply

Across much of the UK seabirds are suffering severe declines and colony failures. At Troup Head, Scotland, guillemots have declined from nearly 40,000 birds in 2001 to barely 14,000 in 2011. Many colonies of kittiwakes in Shetland and Orkney experienced complete breeding failure in 2012 and 2013, and at the RSPB Marwick Head Reserve on Orkney there has been a 63% decline in kittiwakes since 2000. Wales is one of the few areas bucking the trend, but the warning signs are beginning to show for some species, especially kittiwakes. The kittiwake colonies on Ramsey Island held around 450 pairs from 1993 to 2000, but have since fallen to below 200 pairs in most years since 2004. This could be linked to climate change and the increase in stormy weather. Storms create more turbulent waters, causing small fish to dive deep where kittiwakes cannot reach them.

We need to understand why some British seabird colonies are faring so badly. In 2010/11 the RSPB undertook the FAME (Future of the Atlantic Marine Environment) project to determine the foraging locations and distances of seabirds at ten sites around the UK. One guillemot from Fair Isle made an epic 350km journey in search of sandeels and other small fish. By contrast, razorbills breeding on Bardsey in 2011 had a maximum foraging distance of just 40km, and also made shallower dives than those from Scottish colonies (see *Natur Cymru* 41: 14-17). This stark contrast begins to shed some light as to why most Welsh populations are faring better than their Scottish counterparts. Wales sits on the edge of the Gulf Stream, and has persistent shelf sea fronts close to many of our seabird colonies. These fronts result from critical zones in the balance between thermal stratification and tidal turbulence as currents flow over the seabed. Phytoplankton production is enhanced and zooplankton is concentrated at these fronts, making them areas where food resources for seabirds accumulate. Better protection of feeding areas would help ensure that the seabirds don't have to travel hundreds of kilometres to feed, often leaving them exhausted or returning to starved chicks. It is now possible to identify key areas for protected status, and the value of further protected sites should be strongly considered.

©RSPB images

Kittiwake *Rissa tridactyla*
Gwylan goesddu

Unintended consequences

The reforms of the Common Fisheries Policy may help to address some of the issues around food availability, with one of the most prominent measures being the ban on discarded fish. However, whilst this measure should improve fish stocks in the long term, in the short term it may have negative impacts on some species. Dr Steve Votier of Exeter University undertakes annual tagging and monitoring of the gannets of Grassholm Island. His latest (unpublished) report, based on the tagging and monitoring of 60 adult gannets in 2015, discusses the way in which they locate food while foraging at sea. Spontaneous regurgitated items from non-breeders and breeders showed that the gannets' diet was herring/mackerel (44%), followed by discarded whitefish (31%) and garfish *Belone belone* (20%). Once the discard ban is implemented, continued monitoring will show how the gannets are affected in the short or long term, and also if there are any underlying food availability problems masked by the reliance on discarded whitefish.

Gareth Cunningham *works for RSPB Cymru on marine policy matters.*

Unearthing the secrets of the Celtic rainforest

Mike Sutcliffe

Felt lichen *Degelia cyanoloma*

Asked to think of a rainforest and you'd be forgiven if your immediate thought is of the Amazon and not Meirionnydd. And yet the Atlantic woodlands of Meirionnydd, along with those in other parts of Western Britain and Ireland, are part of the temperate rainforest biome. They sit alongside the redwood forests of the Pacific North West, the tree-fern filled forests of Tasmania and the beech forests of southern Chile, as cool temperate rainforest. Tree species apart, the forests look remarkably similar, with steep rocky ravines, a moss- and fern-covered, boulder-strewn woodland floor, and trees covered in a mosaic of lichens.

In conservation terms, our Celtic rainforests are most significant for ferns and lower plants, particularly the lichens and bryophytes. The woodlands of Meirionnydd (and parts of Caernarfonshire) support some of the most significant British populations of old forest lichens outside of western Scotland, including the brown shingle lichen *Fuscopannaria sampaiana* and the blobby jelly-skin lichen *Leptogium brebissonii*. With 10% or more of the global population, Britain is considered to have an 'International Responsibility' for these two species; indeed, Britain is likely the world stronghold for the former. The area is no less important for bryophytes, and is thought to hold as great a bryophyte diversity as almost any other global ecosystem. Many species are rare or absent elsewhere in Europe e.g. the prickly feather-wort *Plagiochila spinulosa* is very rare in continental Europe, and the pale scalewort *Radula voluta* has its nearest colonies in tropical Africa.

Project into the future

As part of the Global Strategy for Plant Conservation, the Celtic rainforest is identified as an Important Plant Area (IPA) – marking it as one of the most important places for plant conservation globally – and as a Special Area of Conservation (SAC) under the EU Habitats Directive. As such it has been, and will continue to be, a focus of Plantlife's work in Wales. A recent project[1] has undertaken an 18-month programme of works to lay the foundations for future work across the IPA by surveying, monitoring, identifying management issues, making management recommendations and contacting and training land managers. Sixteen surveys for lichens and bryophytes covered over 1000 ha (10 km^2) of woodland and made a surprising number of new and important discoveries.

New finds

The barnacle lichen *Thelotrema petractoides* was a particularly exciting and significant find. It is a rare specialist of smooth bark in highly oceanic areas of Scotland and western Ireland, but had never been recorded in Wales. It was found growing on ash and hazel deep in a particularly inaccessible part of a ravine. In 2005 lichenologist Neil Sanderson had found the only Welsh colony of the blackberries-in-custard lichen *Pyrenula hibernica*, growing on hazels in this same ravine. This is changing our understanding of the hazel element in the Meirionnydd woodlands; we had thought much of our hazel woods were a poor cousin, lichen-wise, compared to the more oceanic hazel woods further north and west, but this discovery suggests differently and that perhaps other factors, notably historic human use of hazel, have had a big impact on their continuity and therefore their lichen interest.

Other discoveries include the felt lichen *Degelia cyanoloma*, the first Welsh record since the late 19th century; *Parmotrema robustum* at only its third Welsh site; and *Menegazzia subsimilis* at its only recently recorded site in Wales and England.

One of the bigger jewels in the many-jewelled crown of Meirionnydd bryophytes is the prostrate signal-moss *Sematophyllum demissum*. Des Callaghan discovered this species at two new sites and then undertook a complete dossier of the known and historic sites for this important species. In addition to the new sites it was discovered still to be present at some

Neil Sanderson

'Blackberries in custard' lichen *Pyrenula hibernica*

Peter Lambley

Parmotrema robustum

historic sites, although it appears to have been lost from others; there are now eight currently known sites in Britain, all in the Celtic rainforest of Meirionnydd and Caernarfonshire.

Other discoveries include *Hageniella micans*, found at only its second Welsh site, along with strong populations of the pale scalewort and Hutchins' hollywort *Jubula hutchinsiae*.

Where next? The most frequent and pressing issue is the importance of maintaining grazing in these woodlands. The project repaired 1700m of boundary at Coed Crafnant NWWT reserve, allowing a long term grazing regime to be introduced. At RSPB's Coed Garth Gell reserve, dense regeneration has been thinned and holly brought under control, and plans are now in place to restore grazing to the site to prevent these problems recurring. Invasive non-native species continue to be a threat in the area; three surveyors surveyed approx 1000ha (10km^2) of the Mawddach catchment to map the extent and density of *Rhododendron x superponticum*, and this information will be used to inform a funding bid to undertake its control throughout the area.

The Celtic rainforest continues to reveal its secrets and prove itself to be an incredibly special and important habitat, but it remains under threat from a range of issues. We can now build on the achievements of this project and work with partners to ensure this interest is secure and enhanced into the future.

***Dave Lamacraft** is Plantlife's IPA Lower Plants Champion (England & Wales)*

The project was funded by Welsh Government through its Resilient Ecosystem Fund (administered by Natural Resources Wales) and by the Ashley Family Foundation; partners included RSPB, National Trust, Woodland Trust and North Wales Wildlife Trust.

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Introduction to Permaculture	06-02-16
Permaculture 2	05-03-16
Permaculture 3	09-04-16
Growing Fruit	02/04/16
Bird Survey	16-04-16
Aberystwyth Area	
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PONT – Grazing Animals Project

Like a sleeping dragon, Pori Natur a Threftadaeth (PONT), the Welsh arm of the Grazing Animals Project, has been quiet but watchful for the past 18 months. Now, thanks to a core funding grant from the Welsh Government, a team is in place to help it to fly again. A trio of coordinators will help three regional development officers to establish Local Grazing Schemes with anyone interested in grazing for the benefit of wildlife.

Hilary Kehoe

Grazing is amazing

Good grazing management – the right livestock grazing at the right time and intensity – is essential for maintaining many of our species-rich habitats. It can control aggressive species which would otherwise dominate, sustaining open habitats by preventing the build-up of thatch and scrub encroachment, and creating gaps to allow a diversity of species to germinate and grow.

The lack of appropriate grazing has been identified as a major factor in the failure to meet targets set for habitat condition on Wales's protected sites. This has been acknowledged by the Welsh Government, who are keen to see PONT working towards improving grazing management for wildlife across Wales.

PONT's role is to:

- facilitate the establishment of Local Grazing Schemes and grazing networks through advice, training, guidance material and assistance with securing funding;
- advocate outcome-focused solutions to grazing issues, working across organisations and with individual land managers;
- help launch at least one scheme in each of the Welsh regions (North, Mid and South) in the first year, and further schemes in subsequent years;
- provide training to advisors, land managers and volunteers;
- run events to engage and enthuse the wider public.

In 2016 the team will be organising a conference and training courses for those who need to learn about grazing and related matters.

Next steps

Do you have an area that would benefit from a Local Grazing Scheme or better grazing management? Do you have a scheme ready to go and just need a bit of extra help with funding or practical solutions? The team are keen to meet you and discuss options.

Please contact PONT at **Jan.sherry@pontcymru.org** or **Hilary.kehoe@pontcymru.org**

Natur Cymru 56

Two articles covering different ways of growing crops attracted comments from readers.

'Zero-till and cover crops' pp4-8

Readers expressed concerns about the use of the glyphosate weedkiller Roundup® and its possible adverse effects on wildlife. Author Mike Donovan replies:

"Zero-till is an answer (not necessarily the only one) for a great many farming problems. Getting heavy machinery off the land, reducing compaction and letting bugs and worms do the job naturally, is a really positive move. As an alternative to weedkiller, the Rodale Institute in America uses a ribbed roller to flatten and kill the cover crops, including ryegrass (www.farmideas.co.uk). The kill may not be 100% but the following crop gets going faster and the mulch from the ryegrass stops other weeds from germinating.

Alternative chemicals are generally more toxic, and expensive. My view is that zero-till is something which conventional chemical farmers can get hooked onto, and they discover the biology in their soil and crops. Their enthusiasm for horsepower and 'kit' is transferred to looking for worms, nodules and microbes. Moving away from their use of a relatively innocuous chemical can come later, in my view."

'Weaving the web' pp32-37

Malcolm Berry's enthusiastic and innovative way of gardening brought requests for his contact details, as follows:
Malcolm Berry, 01545 580188.
thedreadedgardener@gmail.com

Natur Cymru needs you

Can you help?

Natur Cymru relies on its susbcribers for most of its funding – can you help to recruit a few more?

We get most of our new subscribers by word-of-mouth and face-to-face contact, attending shows, talks, conferences and other events around Wales. But we are stretched very thin!

If you think you can help us by recruiting at any of the above, or in any other way you can think of (we are always open to new ideas), please contact us on **0300 065 4867** or **info@naturcymru.org.uk**

You will receive:

- A starter pack of back issues, forms and free books or other small items (to tempt them in!), and plenty of advice on how to use them
- Free entry to any events you attend to promote *Natur Cymru*
- Travel costs (by agreement)
- We are willing to pay commission (if you wish) for each subscriber you sign up, as follows: £15 for cash or cheque payments, £25 for each Direct Debit subscription.

Thank you!

We look forward to hearing from you.

Mae ar Natur Cymru eich angen chi

Allwch chi helpu?

Mae *Natur Cymru* yn dibynnu ar ei danysgrifwyr am y rhan fwyaf o'i gyllid – allwch chi helpu i recriwtio ychydig mwy ohonynt?

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Os credwch chi y gallwch ein helpu drwy recriwtio drwy ddefnyddio unrhyw un o'r dulliau uchod, neu mewn unrhyw ffordd arall (rydym bob amser yn fodlon ystyried syniadau newydd), cysylltwch ni ar **0300 065 4867** neu **info@naturcymru.org.uk**

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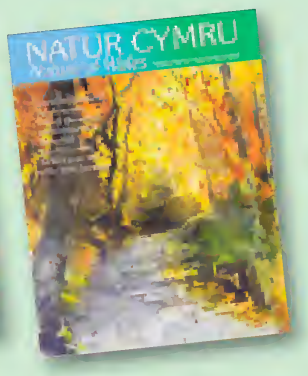

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